

THE RESOURCES OF THE EMPIRE

*A business man's survey of the Empire's resources
prepared by the Federation of British Industries*

THE RESOURCES OF THE EMPIRE SERIES

Comprising twelve self-contained volumes dealing with the principal industries. Each volume contains a Foreword by H.R.H. the Prince of Wales, K.G., and a General Introduction by Sir Eric Geddes, G.C.B.

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THE RESOURCES OF THE EMPIRE SERIES

MEAT, FISH, AND DAIRY PRODUCE

BY

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WITH AN INTRODUCTION BY
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(Vol. I, Part II)



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INTRODUCTORY REVIEW

BY

SIR GORDON CAMPBELL, K.B.E.

THERE may be different opinions as to the desirability of making the British Empire entirely self-supporting, to the exclusion of all trading with foreign countries; but no one who studies the problems of world economics can fail to realize that the British market is much too dependent upon foreign countries for its supplies of essential food-stuffs. That this dependence constitutes a source of weakness in times of national emergency was conclusively proved during the late War. The prices we were compelled to pay to American and Argentine producers for meat supplies during the War (to quote only one instance) were on a much higher scale than those paid to Dominion producers.

Unfortunately, owing to less favourable climatic conditions, more expensive labour and working costs, greater distance from the consuming market, and other disadvantages, several of the producing Dominions are handicapped in competition with some of their more fortunately placed foreign rivals, and in order to compete with these foreign countries Dominion producers are compelled to work on a much smaller margin of profit.

Amongst the foods of animal origin imported into this country the most important is meat. The value of our imports last year of this class of food, comprising beef, mutton, lamb, bacon, ham, pork, offal, tinned meats, etc., was £109,438,000. Our supplies of beef come as to 83 per cent. from South America, and 12 per cent. from Australasia. Conditions in the Argentine Republic are almost ideal for beef production on a large scale at a low cost. The climate is temperate, the soil is fertile, labour is cheap, inland transport facilities are exceptionally good, and the freezing works, though few in number, are concentrated at the loading ports, and are of a size that enables overhead charges to be reduced to a minimum. In addition, there is the further advantage that the River Plate is only three weeks' voyage from the consuming market.

In contrast with South America, Queensland, which is the next largest beef exporter, suffers from a number of disabilities, including frequent droughts, insect pests, deficient transport, heavy working charges, and long distance from the market. Conditions in New Zealand are more favourable than in Australia in many respects, but high land values and working costs prevent any profit being made on the production of beef at the present level of prices.

In regard to sheep-raising, the Empire is much more favourably situated. New Zealand is not only the biggest exporter of mutton and lamb, but also produces meat of the finest quality; while Australia, although erratic, is also an important source of supply. But here, again, South America is becoming a very important competitor. Whereas four years ago only 17 per cent. of mutton and lamb importations were of foreign origin, last year the proportion was 39 per cent.

Our imports of pig meat (bacon, ham, pork, and lard) are now valued at £50,000,000, but the Empire's share of that trade (if Ireland be excluded) is

negligible. Canada is the only important Dominion shipper, but she has a hard struggle to compete with the United States, with its vast and closely protected home market and big maize crop, which enable huge quantities to be produced at a low cost. The other Overseas Dominions are too far away to allow of a bacon and ham trade to be carried on successfully, and the pork market is too uncertain to be profitable at such a distance.

Turning to dairy products, the Empire has much less to fear from foreign competition so far as butter, cheese, and dried milk are concerned, although Denmark will always be a thorn in the flesh of the New Zealand producer, who claims that his butter is equal in quality to Danish, but cannot obtain equal prices, because Danish butter is fresh, whereas New Zealand butter is two months old when it reaches the market.

The solution of the problem as regards poultry and eggs seems to lie in the organization and development of home production, although there is no reason why the Dominions should not take a hand in this trade as a side line.

The area of land under the British flag is more than large enough to produce all the meat, dairy produce, poultry, eggs, etc., required by the British consumer but the practical difficulties touched upon above have to be faced. Naturally capital is attracted more readily to those parts of the world where the conditions promise the most profitable return. It takes many years of unremunerative labour, and a vast expenditure of capital, to breed up the livestock of any new country to the standard required by the British market, and unless some strong inducement is held out in the form of profitable returns, the necessary capital and enterprise will not be forthcoming.

The problem, then, resolves itself into the question whether it is possible to encourage the various countries of the Empire to produce more food-stuffs on a commercial basis, in competition with more favourably situated foreign countries, without resorting to artificial means of stimulation.

The British public are no doubt anxious that food production within the Empire should be encouraged; but it is manifest that they are not prepared to do so if the result is likely to be higher food prices. So long as British consumers insist upon buying in the cheapest market, irrespective of whether that market is British or foreign, so long will foreign producers with cheaper labour, more favourable natural conditions, or a more convenient geographical position, continue to maintain the position they have won in the British market.

In those cases where the Dominions have the natural advantages on their side, the problem does not exist. The matter may be left to the free play of economic forces. But in the many instances where Empire production is more expensive than foreign production, some means must be devised whereby Empire trade may be stimulated without raising the price of the product.

The first step towards solving a problem is to get all the facts of the case presented in proper perspective. In the following pages will be found information and statistics relating to the production and distribution of Empire food of animal origin, assembled in a form that should prove useful to producers and distributors, and also be of interest to the general reader.

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MEAT, FISH, AND DAIRY PRODUCE

SECTION I

SURVEY OF PRODUCTS

THE first part of this volume has reviewed the resources of the British Empire with regard to food and vegetable origin. It was therefore concerned with agriculture in the limited sense, as meaning the production of crops, and with horticulture, taken in a broad sense to include the growing of fruit, vegetables, and edible nuts. All crops, however, are not food crops, so that a number of agricultural products have been relegated to other volumes of this series. Cotton, flax, sisal, and other fibre plants are dealt with in Vol. III.; rubber, tea, coffee, cocoa, spices, and tobacco in Vol. IV.; industrial alcohol in Vol. VI.; and oil seeds in Vol. X.

It is here proposed to review the resources of the Empire in respect of food of animal origin. These may be grouped under five main headings: Pastoral Products, Poultry and Eggs, Honey, Rabbits and Game, and Fish.

I.—PASTORAL PRODUCTS.

These represent a portion of the output of the pastoral or livestock industry, a branch of agriculture if this be defined in the wider sense. We are here only concerned with food, and many pastoral products are dealt with elsewhere: wool and mohair receive treatment in Vol. III.; hides, skins, bones and horn, hair, bristles, and glue in Vol. V.; tallow and stearine in Vol. X.

1. LIVESTOCK.—For many operations on the land, including transport, certain animals are of great importance for the production and distribution of food, and therefore require brief mention. *Horses* take the leading position in the temperate parts of the Empire, though to some extent displaced by mechanical power, especially in cultivation or harvesting on a large scale. *Asses* and *mules* are also employed to a considerable extent for various purposes, and their value must not be underrated. The former is essentially the "poor man's horse," and plays an important part in the distribution of produce in the United Kingdom, while many of the donkeys of Egypt and similar countries are comparatively large and powerful animals. Mules, owing to their sure-footedness, are particularly useful in the development of some of the more mountainous parts of the Empire, but are probably not employed to the extent they deserve. The domesticated *buffalo* in India, Ceylon, Malaya, and Egypt, ranks high as a beast of burden and for draught purposes, as well as for meat and milk production;

while *camels* are adapted for transport in arid and semi-arid regions, such as parts of India, Africa, and Australia. The *Indian elephant* can carry a load of 800 pounds for some twenty miles over rough or swampy ground, and is therefore of much value in the transport of agricultural produce.

Cattle, sheep, pigs, and goats, as sources of food, are dealt with under subsequent headings.

Living animals, including those for immediate slaughter, figure to a considerable extent in Imperial exports and imports; pedigree stock in excess of home requirements are raised in the United Kingdom for the establishment or maintenance of breeds in other parts of the Empire and also in foreign countries.

The world population and Empire population of the chief kinds of livestock are very roughly represented by the following figures, which only have reference to the countries supplying statistics to the International Institute at Rome and represent about 75 per cent. of the world population for horses, cattle, and sheep, and rather more than 50 per cent. for goats and pigs. The returns for British Africa are much below the mark. The numbers are given in millions.

	<i>Horses.</i>	<i>Cattle.</i>	<i>Sheep.</i>	<i>Pigs.</i>	<i>Goats.</i>
World ..	73.0	376.1	393.5	126.7	65.8
Empire ..	11.8	202.2	201.6	10.0	51.9

2. MEAT AND FAT.—It is hardly possible to over-estimate the importance of meat as a staple food, and it only comes second to wheat. After the primary problem of "bread and meat" has been satisfactorily solved other food resource matters are comparatively simple.

Cattle for beef production take a leading place, while *sheep* for mutton are also of prime importance. *Goats, buffaloes, and camels* also play a part in meat production.

Various *preservative methods* have played an exceedingly important part in the meat industry by enabling transportation for long distances, and accelerated means of transit have at the same time brought the different parts of the world into closer touch. Such methods all either destroy or arrest the action of the germs (bacteria) which cause putrefaction, and are applicable to both vegetable and animal products. The most primitive method is *drying*, but this is of little commercial importance in the case of Empire meat, though largely employed for fruit and vegetables. Dried meat is a minor trade commodity in the Sudan. *Salting, pickling, and curing*, use chemical agents to prevent decomposition, familiar examples being afforded by bacon, ham, and several kinds of preserved fish. But here the products have acquired special flavours, quite unlike those of the fresh commodities. The problem for beef, mutton, rabbits, poultry, and so forth, is to secure effective preservation without destroying the original taste.

Canning, or tinning, already mentioned in connection with fruit and vegetables, is largely employed for meat, and it was devised by François Appert, a Frenchman, in the early part of last century. Though many improvements have been devised, the general principle remains the same, and consists in destroying many deleterious germs by cooking the meat in a tin, this being sealed up in such a way as to prevent the access of living germs from the air. There have, however,

been a certain number of fatalities caused by canned foods, some owing to the generation of metallic poisons by the action of acids on the tins, and others as the result of the presence of certain germs which produce virulent poisons (toxins) that are *not* destroyed by heat. Hence we sometimes hear of "ptomaine poisoning," and, more rarely, of "botulism." Eight persons lost their lives from the latter at Loch Maree in August, 1922, the cause being sandwiches prepared with infected potted meat. Had the suitable antidote (antitoxin) been available, these deaths might have been prevented, and as the result of action on the part of the Ministry of Health, it is now stocked at several centres in England and Scotland.

The risk of metallic poisoning has now been minimized in the case of certain potted products by transferring them to a glass or earthenware receptacle after sterilization. There is but slight risk of ptomaine poisoning if the material to be canned is free from taint, but the botulism germ (*Bacillus botulinus*) is more difficult to guard against, though fortunately rare. It has been found from time to time in a considerable number of foods, including vegetables, beans, cheese, ham, and sausages.

Dr. W. G. Savage, a leading authority, thus summarizes the leading points with regard to tinned foods: "While they have definite and special risks of their own, these are not large, and are for the most part readily guarded against. Compared with fresh foods, and the very haphazard, inadequate, and neglected control which they receive, canned foods are undoubtedly safer. They should not be made the main articles of diet, and provided this is avoided, any possible deficiency in vitamins is readily made good from other sources" (*Canned Foods in Relation to Health: Milroy Lectures*, 1923).

The preservation of meat and similar products by *freezing* or *chilling* has of recent years been brought to a high pitch of perfection, and has led to the establishment of a large and important industry naturally associated with cold storage. It dates back to 1879, when Bell and Coleman installed a cold-air refrigerating plant on the *Strathleven*, which carried the first cargo of frozen meat from Australia to London. When meat is actually frozen its tissues are to some extent disrupted, so that the appearance when thawed is not attractive, besides which the entry of germs and consequent decay are promoted. Freezing has consequently been largely superseded by "chilling," which is not followed by these undesirable results, and is equally effective. In this case the temperature is only lowered to about 28° F., and germs in the surrounding air are destroyed by the vapour of formaldehyde.

Beef "extract" affords scope to a subsidiary industry, of which the output is considerable.

Superfluous beef and mutton fat, as *suet*, is a well-known food-stuff, and also, under the name of *tallow*, is of great importance for various industrial purposes (see Vol. X.). It is one of the raw materials worked up into butter substitutes (p. 12).

The by-product *gelatine*, one of the finer preparations of the glue industry (Vol. V.), is largely used in the making of soups and jellies, and is also of importance in the preparation of various kinds of confectionery.

Pigs are notable as the source of a great variety of food-stuffs, including fresh, pickled, and salted pork; bacon and hams; and brawn, which is one of the products most frequently canned. Pig-fat, or *lard*, is also of great value, both as a food and for industrial purposes.

Goats, except locally, are of secondary importance for meat production, but possess considerable value from the dairying standpoint (p. 13). *Buffaloes* and *camels* are also used for meat and milk production.

Blood, bone, and slaughter-house refuse play some part in agriculture, for they are worked up into a variety of manures, as also are shoddy, wool waste, and residues from the glue and horn industries.

3. DAIRY PRODUCTS.—The dairying branch of the pastoral industry, in which cows' milk is the primary product, has been highly developed not only in the United Kingdom, but also in the Dominions of Canada, Australia, and New Zealand. Since the pioneer work of Robert Bakewell, in the latter part of the eighteenth century, nearly a score of British breeds of cattle have been established. Some of these, such as the Hereford and Aberdeen Angus, are notable for beef production; others, among which Shorthorns take the leading place, are "dual purpose" (beef and milk); and others again are more or less specialized dairy cattle, among which Dairy Shorthorns, South Devons, Red Polls, Ayrshires, and the Channel Islands breeds may be specially mentioned.

Milk, in the fresh condition, is mainly produced for local consumption, though with increased rapidity of transport and improved methods of carriage it may now reach the consumer from considerable distances, travelling by land. There is also a considerable industry in tinned milk products prepared by methods of evaporation, such as *condensed milk* and *milk powder*. The latter, when reconstituted by the addition of water, closely resembles fresh milk, though deficient in vitamins, which are attenuated if not destroyed by heat and desiccation. This, however, is of no great importance, for the addition of a few drops of orange or lemon juice, or even raw potato juice, to a pint of the reconstituted milk will make the vitamin content quite satisfactory. These tinned milk products are a great boon to the white residents in India, Malaya, our tropical African Colonies, and other parts of the Empire where fresh milk may be difficult to obtain.

Butter, like meat and fruit, is easily kept fresh by the application of cold, and this has been of enormous importance for the development of the dairy industry in Australia and New Zealand. Grass-fed butter from these Dominions competes in the winter market of the United Kingdom, which is then at its worst.

Butter substitutes, usually passing under the name of *margarine*, owing to their cheapness and improved character, have become important commodities, and butter shortage during the War caused them to be consumed in very large quantities, doing much to remove popular prejudice. The substances worked up into margarine are of mixed origin, and consist partly of animal fat (suet) and partly of vegetable fats (see Part I., p. 30), a proportion of butter being sometimes added.

Cheese is a particularly nutritious food of concentrated character, chiefly consisting of a nitrogenous compound (casein) and fat. Its manufacture on a commercial scale is a distinct branch of the dairy industry, and cheese-making is

also an important means of utilizing surplus milk which might otherwise be wasted or disposed of at an unremunerative price.

Though cows are by far the most important dairy stock, goats have also a certain value in this connection, their milk being particularly rich, and well adapted for feeding infants, as also for the use of persons suffering from wasting diseases. Goat butter is but little known, but some esteemed varieties of French cheese are made from goats' milk, these including Mont d'Or, Levroux, Sassenage, and St. Marcelin. Goat-farming, however, can hardly be said to be a well-developed British industry so far as dairying is concerned.

Roquefort, a well-known French cheese, is made from the milk of a special breed of sheep. In those parts of the Empire where Indian buffaloes and camels are domesticated, their milk is largely employed for local consumption.

II.—POULTRY AND EGGS.

Ducks, geese, turkeys, and guinea fowl, are of more or less value as food in various parts of the Empire, but the important poultry industry is mainly concerned with domesticated *fowls* for table purposes and for egg production. As an adjunct to ordinary farming its value is undoubted, and by it various waste products are turned to profitable use. But utility poultry-farming, as a distinct industry, involves much labour, and the high prices of the necessary feeding-stuffs impose another heavy charge. Vigorous attempts are being made in the United Kingdom to develop the industry by improvement of breeds, and by stimulating the production of cheaper poultry food in certain parts of the Empire. In the Kenya Colony, for example, mass production of maize on native holdings is being encouraged, and this is expected to result in the export of large quantities of grain that can be sold at a reasonable price to poultry-farmers in the United Kingdom and elsewhere.

The preparation, grading, and packing of produce is here as important as in the case of fruit and vegetables, and the remarks made about the business side of farming (Part I., p. 128) apply here with equal force. It may also be added that poultry-farming is an industry particularly suited to women, large numbers of whom have already shown special capacity in this direction. There can, indeed, be little doubt that women migrants from the United Kingdom are destined to play a great part in the development of the poultry and dairy industries in some of the Dominions and Colonies.

The application of cold for preservation in transit and during storage, which has done so much to facilitate the export of meat, is also well known in this branch of food production, and chilled fowls are already an important commodity. There is also a certain amount of canning, paste preparation, and the like.

Eggs, being a naturally concentrated food of high nutritive value, are imported and exported on a very large scale, and the trade has developed along several lines. In regard to "fresh" eggs the methods of collection, grading, and packing have been greatly improved, and co-operative methods of marketing have attained a considerable measure of success. The shortage of supply during the colder parts of the year in temperate parts of the Empire and other countries has led

to the expenditure of much ingenuity on methods of preservation, though much more may yet be done in this direction. For eggs in shell the old lime-water method is largely replaced by the use of water-glass. Chilling is also resorted to, but has the disadvantage that the eggs soon depreciate in quality when their temperature is again raised to the normal. Of recent years desiccated eggs, from which the shells have been removed, have found a large market.

III.—HONEY.

Bee-keeping is for the most part an adjunct to ordinary farming, dairying, or horticulture, but may also be run as an independent enterprise, which includes the sale of stocks and queens. Strictly speaking, honey belongs to the foods of vegetable origin, being the nectar of flowers, but as this undergoes chemical changes in the interior of the bees that convert it into honey, and bees may be regarded as livestock, there is some justification for considering apiculture as a branch of the pastoral industry.

Beeswax, another product of apiculture, has an industrial value, and is dealt with elsewhere (Vol. IX.).

IV.—RABBITS AND GAME.

Rabbits are of some importance as food, to say nothing of the value of their skins, and chilled rabbits are exported from Australia in large numbers, which is some set-off to the immense amount of damage they do to the crops of the Commonwealth. Game of all kinds may be regarded as a luxury, but the total Empire consumption must be very considerable, and they reach a respectable figure in some of the lists of imports and exports.

V.—FISH.

Fish constitutes a nitrogenous food comparable to meat as regards feeding value, and is employed as a meat substitute to a considerable extent, particularly in Catholic countries. In the United Kingdom the annual consumption of sea fish is about 40 pounds per head of the population. This figure is for "wet" fish—*i.e.*, fish other than shellfish, which also are consumed to a considerable extent. The fresh-water fish, which are the product of inland fisheries, are less important than sea fish, but are the object of a considerable industry in Canada. The inland fisheries, however, also deal with salmon, which are really sea fish though they ascend rivers to spawn.

The deep sea outside the territorial limit is the seat of the main branch of the fishing industry, and this is open to exploitation by foreign nations, among which Japan, the U.S.A., Spain, Portugal, France, and Norway are our most notable rivals. Immense improvements have taken place in deep-sea fishing during recent years. The substitution of mechanically propelled craft for sailing vessels has largely taken place, and there have been great advances in the methods of securing the catch. A beginning has been made in the application of wireless telegraphy to trawlers, and wireless telephony is certain to be introduced later.

Fish being much more perishable than meat, the introduction of *refrigerative methods* has had much to do with stimulating progress, so that now the consumer living, say, in London no longer depends on the narrow seas alone for his fresh fish, for these may have been caught as far off as the coast of Morocco or the neighbourhood of the White Sea. There has, however, always been a drawback to the method of freezing fish in air, for this involves considerable disruption of tissue, rapid deterioration on thawing being the sequel. The same objection does not apply to freezing in liquid, and a *brine-freezing* method has been perfected which is likely to have far-reaching consequences on the export trade.

The salting and curing of fish is an important industry, of which the herring is the chief but by no means the only object. British exports of this kind have been greatly reduced as a result of the War, some of the more important foreign markets, especially those of Germany and Russia, having been completely disorganized.

Certain *potted* and *paste products* have attained considerable popularity, salmon and shrimp being the two commonest components of these. The remarks already made (p. 11) on ptomaine poisoning and botulism apply here also.

Fish canning is largely practised in Canada and Newfoundland, and to some extent in the United Kingdom. Salmon, herrings, pilchards, sprats, brisling, with lobster and prawns among shellfish, are of most importance. As an Empire industry there seems to be no reason why this branch should not be developed to a very considerable extent. The sea fisheries of the United Kingdom, Canada, and Newfoundland are by far the most important in the world, and there is very little in the fish line, except true sardines (pilchard fry) with which we are not able to supply our own demands without importing from foreign countries.

There are a number of valuable fishery by-products, some being of the nature of food. Genuine *isinglass* is derived from the sounds or air-bladders of various fishes, the most esteemed being yielded by the different species of sturgeons that inhabit the rivers and estuaries of central and northern Europe. True *caviare*, as is well known, is prepared from the hard roes of sturgeons. The livers of many kinds of sea fish are employed in the production of oil used for various purposes. First-grade *cod-liver oil* is for human consumption, while second-grade is a valuable stock food. Other kinds of fish oil are used in various industries. Fish waste, such as heads, bones, etc., is worked up into fish meal for stock feeding, and fish guano is a nitrogenous manure.

It will be evident from the brief survey of food-stuffs of animal origin which has now been given that the resources of the Empire are ample. Production in many cases is on the increase, the dairy products of New Zealand furnishing a striking example, while production of meat for export is a leading Australasian industry, and is becoming important in the Union of South Africa. The United Kingdom and Newfoundland occupy first place in world fisheries.

The undeveloped Imperial resources are almost without limit, and though the Empire imports large amounts of meat, pig products, dairy commodities, and eggs, from foreign countries, this should become less and less necessary in the future.

Section II. of this volume will deal in succession with the different parts of the Empire as regards their shares in the production of the commodities already enumerated, their needs and how they are satisfied, and the disposal of their surplus by inter-Empire and foreign trade. It will be convenient to adopt the usual main geographical headings of Europe, Asia, Africa, America, and Australasia. Egypt is so new a self-governing country, and its connection with the British Empire has been so intimate, that it will be included in the African sub-section, especially as the chief statistics given are for 1913-14 and 1921-22. The mandated territories of Iraq and Palestine, on the other hand, are treated as foreign countries. The figures relating to total areas and populations given in Part I. are not repeated here.

Section III. deals with general problems that arise in connection with the production and distribution of foods of animal origin, and summarizes part of the information detailed in the preceding sections.

The volume ends with general conclusions regarding Empire food of all kinds, whether of vegetable or animal origin, as there are intimate connections between all the industries concerned. A bibliography is appended, and also lists of the chief sources of information, apart from books and other, and of the leading organizations concerned with the importation and exportation of Empire food products.

SECTION II

SURVEY OF THE EMPIRE

EUROPE

UNITED KINGDOM

1. **LIVESTOCK.**—The United Kingdom is particularly noted for its high-class breeds of agricultural horses, cattle, sheep, and pigs, which are known all over the world. The imports and exports of live animals are considerable, the latter being very largely for breeding purposes. Exports of this particular kind have played an important part in building up and maintaining at a high level the herds and flocks not only of other parts of the Empire, but also of various foreign countries, such as Argentina, where fresh blood appears to be necessary from time to time.

Much public and private effort is being devoted to the improvement of all classes of livestock, without which the best results cannot be obtained in the various branches of the pastoral industry. Such improvements as have been effected during recent years are partly due to the provision which has been made of different grades of agricultural education, which has helped to disseminate sound views as to the superior value of pedigree stock. But a great deal still remains to be done in this direction.

NUMBERS OF LIVESTOCK IN GREAT BRITAIN AND IRELAND.

	<i>Horses.</i>	<i>Cattle.</i>			<i>Sheep.</i>			<i>Pigs.</i>
		<i>Cows and Heifers.</i>	<i>Other.</i>	<i>Total.</i>	<i>Breeding Ewes.</i>	<i>Other.</i>	<i>Total.</i>	
1913 ..	1,865,745	4,300,611	7,595,868	11,896,479	11,025,059	16,527,077	27,552,136	3,294,215
1921 ..	1,894,549	4,575,421	7,281,558	11,856,979	9,625,780	14,572,534	24,198,314	3,628,133

2. **MEAT.**—From the point of view of national defence we are much better off here than in the case of wheat. The total supply of meat (including pig meat) of the United Kingdom for 1913, 1921, and 1922 (year ending May 31) was as follows (in thousands of tons):

	<i>Home.</i>	<i>Imported.</i>	<i>Total.</i>	<i>Percentage Home.</i>
1913	1,516	1,055	2,571	59·0
1921	1,169	1,202	2,371	49·3
1922	1,325	1,217	2,542	52·1
I. 2		17		2

A large proportion of the meat included in home production is Irish, and the position of Great Britain alone is not very satisfactory, as will be realized from the fact that in 1922 the meat produced there only amounted to 41 per cent. of the total supplies.

The importance of animal husbandry is indicated by the relative value of live-stock. It was estimated for 1922 that these accounted for 41 per cent. of the total proceeds of sales in Great Britain of farm products of every kind. Meat, of course, is one of the main food-stuffs in this country, and in an average family 28.66 per cent. of the money laid out on food is expended on butcher's meat, bacon, lard, and suet.

The Departmental Committee on the Distribution and Prices of Agricultural Produce have recently (1923) published an *Interim Report on Meat, Poultry, and Eggs*, from which the above figures have been taken, and which not only contains much valuable information, but makes a number of important suggestions. Our elaborate marketing and distributive systems are susceptible of various improvements in the interests of the home-producer and the consumer. The competition between home produced and imported meat is exceedingly keen, and the railway rates are in favour of the latter. Chilled and frozen imported meats have also the advantage in other ways: "... The position of the home producer is increasingly prejudiced as the result of the improved organization for the marketing and distribution of imported meat supplies, and of the policy of the Governments of Australia and South Africa in subsidizing exports to this country. The advantages accruing from the distributive machinery at the disposal of the overseas producer are apparent in the quality of the supplies offered to the British consumer, in the costs of marketing, and consequently in the final price. It is, therefore, essential that every effort should be made to improve the system of marketing and distributing British meat and to reduce the costs involved . . . the interests of the home producer and of the consumer equally demand that the control of the total meat supplies of this country should not pass into the hands of importers" (*Interim Report*, p. 149).

Here we have a specific case of conflict between the interests of the United Kingdom and those of certain Dominions, which ought to be considered and adjusted by the authorities of the Empire. As the *Interim Report* very justly remarks (p. 102): "... If means could be found to co-ordinate the production within the Empire as a whole and encourage it in a spirit of give-and-take as affecting food-stuffs generally, it might be possible to regularize supplies and stabilize prices both here and overseas, with benefit to all. The question arises whether aims which are now being left to drift into divergence, perhaps into economic antagonism, could be harmonized in a way that would make the interests of this country and the Dominions complementary to one another."

Pig Products.—There can be no doubt that much of the United Kingdom is particularly suitable for pig production, in view of which fact it seems a great pity that our reliance on imports is so large. The value of pig-meat imported into this country in 1922 was no less than £46,000,000, of which £3,000,000 was for bacon. There are many difficulties in the organization of our swine

industry, one being the question of steady supply of suitable pigs to bacon factories. We appear to be handicapped by the possession of an excessive number of breeds, and by the conflicting interests of pork and bacon. Meanwhile two-fifths of the bacon we import is supplied by Denmark, who, after careful study of our markets, was able to provide a commodity appreciated by our consumers.

3. DAIRY PRODUCTS.—Our position here is dealt with in an *Interim Report on Milk and Milk Products* published (1923) by the Departmental Committee on Distribution and Prices of Agricultural Products.

Expressed in millions of gallons, the milk produced in Great Britain during 1921, excluding that used for calf-rearing, amounted to 1,220, accounted for as follows:

	Million Gallons.
Consumed as liquid milk	600
Butter	394
Cheese	100
Cream and miscellaneous	61
Wastage	30

Imported dairy products (expressed as milk) for the same year totalled 1,470, coming under three headings:

	Million Gallons
Butter	1,084
Cheese	309
Condensed milk, etc.	1,470

This gives a total consumption of 2,690 million gallons, 45 per cent. of this being home produced. The corresponding figures for 1922 were: Home, 1,320; imported, 1,570; total, 2,890; percentage home produced, 46.

In Scotland and North Wales the advantages of co-operation in the dairy industry have been satisfactorily proved, and there is considerable scope for further developments in this direction. Distributive methods have greatly improved of late years, in the London area more particularly, but transport facilities leave a good deal to be desired.

It appears that in the U.S.A. and some other of the more progressive countries the consumption of milk, in proportion to the population, is more than double our own. The following general remarks are made in the *Interim Report* (p. 92): "By efficient organization this country can and should be made far more, if not entirely, self-supporting in its supplies of cheese, butter, condensed milk, cream, and milk powder. In condensed milk a profitable export trade is also possible. There are, indeed, many directions in which the industry can promote its own expansion and progress. The public demand for home produce of the first quality is undoubted, and, as regards dairy produce, all concerned in the industry should feel it a reproach that, with our natural advantages and accumulated experience, we are so dependent upon overseas supplies of these essential foods."

Margarine and Other Butter Substitutes.—Raw materials (partly and otherwise) and the finished product were imported as follows (thousands of tons and £):

	1913.		1921.	
	<i>Empire.</i>	<i>Foreign.</i>	<i>Empire.</i>	<i>Foreign.</i>
Oleo and edible vegetable oils (other than olive) ..	5.0 (£196)	36.3 (£1,543)	10.7 (£618)	49.6 (£3,103)
Margarine, etc. ..	2 tons (£105)	25.9 (£3,917)	3 tons (£394)	52.3 (£5,222)

4. POULTRY AND EGGS.—The poultry industry was greatly disorganized by the War, and the reduction in the numbers of the poultry population of Great Britain, as shown in the following figures, will give some idea of the decline. During the last two years (1922-23), however, considerable progress has been made, not only as regards increase in the number of stock, but also by the adoption of improved methods of breeding and feeding, that have had a marked influence on the output of eggs.

THOUSANDS OF POULTRY IN GREAT BRITAIN FOR HOLDINGS OF OVER ONE ACRE.

	<i>Fowls.</i>	<i>Ducks.</i>	<i>Geese.</i>	<i>Turkeys.</i>	<i>Total.</i>
1908	32,356	2,963	712	697	36,728
1913	33,080	2,397	597	709	36,783
1921	29,032	2,631	540	515	32,718

The number of eggs produced in Great Britain for 1922, including estimates for holdings smaller than one acre, was about 1,750 millions; the net imports (including those from Ireland), 2,575 millions; so that the percentage for home production was 40.

Since the War there has been a great reduction in the United Kingdom imports of eggs and poultry, chiefly due to the complete disorganization of Russia. The figures for 1913 and 1922 are as follows:

IMPORTS OF EGGS AND POULTRY (UNITED KINGDOM).

	<i>Eggs</i> (Millions).	<i>Live Poultry</i> (Number).	<i>Dead Poultry</i> (Tons).
1913.. ..	2,589.6	858,979	13,923
1922.. ..	1,639.4	224,268	8,602

In this connection the Departmental Committee's *Interim Report on Meat, Poultry, and Eggs* points out the opportunities arising for home producers (p. 156): "The outstanding feature of the poultry industry as we see it at the present time is the immense opportunity for expansion and development which awaits the home producer. Imports of both poultry and eggs are appreciably below their pre-War dimensions, and it should be his concern to see to it that they do not recover. To that end, though increased production and increased attention to breeding are essential, it is perhaps even more important that he should make

an earnest effort to ensure that his produce reaches the market as effectively and attractively packed, and as fresh as, if not fresher than, the imported article. There can be little doubt that producers in those continental countries which, owing to internal causes, have temporarily ceased to export poultry produce to these shores will sooner or later seek to re-enter the British market. They can only be resisted by the home producer enlarging and consolidating his position."

Since the above was written, the export of eggs from some of the disorganized parts of the Continent has much increased. Poland was approaching the pre-War figures during the autumn of 1923, while Rumania and the Ukraine were both sending large consignments of eggs to Danzig for shipment. The home producer of eggs will also have in future to compete with produce from New Zealand, for the first consignment from that Dominion—carefully graded and packed, and reported to be in excellent condition—reached this country early last December (1923).

Eggs "not in shell" represent a comparatively new kind of poultry product, of which we imported 23,600 tons, value £2,790,000, in 1922. The term includes albumen and yolk, mostly from China, and partly employed for industrial purposes; dried eggs; and egg powder.

5. RABBITS AND GAME.—Home produce was supplemented by imports as follows:

	Thousands.	1913.		1921.	
		Empire.	Foreign.	Empire.	Foreign.
Rabbits	{ Tons	—	2·18	—	0·23
	{ £	—	125·4	—	28·2
Rabbits, frozen ..	{ Tons	24·09	5 cwt.	11·59	0·12
	{ £	655·9	£10	522·0	0·51
Game, live	{ Number	—	—	403·8	0·23
	{ £	—	—	10·6	1·66
Game, dead	{ Tons	—	—	32	0·27
	{ £	—	—	£1,337	34·1

6. HONEY.—The amount of honey produced in this country has not been estimated. The imports (in tons and thousands of £) were as follows:

1913.		1921-22.	
Empire.	Foreign.	Empire.	Foreign.
555 (£18·8)	1,036 (£31·8)	665 (£47·3)	579 (£34·5)

7. FISH.—The sea-fishing industry of the United Kingdom is the most important in the world, as may be seen by comparing the total annual value of the catches made by the chief countries for a given year. Taking 1920 (or nearest year available) the figures are: United Kingdom, £29,042,000; Japan (1919), £21,138,000; U.S.A. (average 1908-18), £15,000,000; Spain, £14,963,000; Canada (1920), with Newfoundland (1918), £10,241,000; Portugal, £9,803,000;

France (1918), 9,400,000; Norway (1919), £8,835,000; Holland, Denmark and Sweden, £7,471,000.

During the five-year period 1908-13 the average annual amount of wet fish landed by our own craft at United Kingdom ports was 1,165,000 tons, about 60 per cent. of which would be for home consumption, and the balance (mainly herrings) for export. At the same time, about 140,000 tons of fish in all forms was imported every year.

Since the War there has been acute depression and much distress in our sea-fishery industry from various causes. For example, the export of herrings in various forms, formerly carried out on a large scale, has greatly declined owing to the complete disorganization of the German and Russian markets which used to take 80 per cent. of the fish exported. It is true that some little improvement is taking place, but not enough to afford any substantial relief. The present high prices of fish, mainly due to expensive distributive methods prevent its consumption as a meat substitute, so that the industry can find no expansion in this direction.

Just as the existence of a vigorous and thriving agricultural population is essential to the best interests of the country, quite apart from the question of food production, so also with regard to the sea-fishing community. "The fisheries breed natural seamen. This country is not, and never can be, self-supporting in respect of food or of the greater part of the raw material of its industries. We depend for our existence, both as a single nation and as the heart of a great Empire, upon the maintenance of our sea communications. For this purpose we must have a great and highly efficient merchant service, and we must have men and ships able and ready to protect our commerce and our shores should either be threatened with attack. The call of the sea is heard by many who, being bred inland in towns or counties, take service in the mercantile marine or the Royal Navy, but it is in the fishermen that the sea sense is inbred and seamanship most highly developed. The fisherman knows his own waters as a man knows his own house; he goes to sea and remains at sea in vessels specially built to ride out the worst weather; in his small ship—and it is the small ship which is the best school of seamanship—he handles a variety of gear (the trawl, the drift-net, the seine, the long line) night and day under the severest conditions; he returns to port only to put to sea again as soon as his ship has had time to unload her catch and to turn round—commonly within thirty-six hours. Hard work and danger are so familiar to him that he would almost be lonely without them. . . . This gift of seamanship is a precious heirloom of the whole British race" (Henry G. Maurice, *Times Trade Supplement, Fishing Industries Section*, April 14, 1923).

The position of the *canned fish* industry in this country seems rather anomalous, for most of the product (mainly herring) is exported, while the home demand for canned fish is chiefly met by imports, among which salmon, sardines, and lobster bulk heavily.

The British *shellfish* industry is of considerable importance, and the Ministry of Agriculture and Fisheries is endeavouring to develop it in various ways. Our *oysters* have been noted from Roman times, and "natives" cannot be

surpassed for quality. But oyster culture is not practised in the same elaborate way as in France. *Mussels* are not consumed as human food to the same extent as in some other countries, but are particularly valuable as bait.

Our fresh-water fishes are of no great importance as a source of food, but the Departmental Committee on Fresh-Water Fisheries (1917-20), of which Lord Desborough was Chairman, reported that our home supply of eels might be very largely increased. The demand is considerable, and has been estimated at 7,000 tons per annum, mostly imported from the Continent. There are many places in this country suitable for eel-farming, and millions of young eels (elvers) ascend our rivers every year. Indeed, before the War, the Germans had a depot at Epney-on-Severn, from which 17 million elvers were forwarded to Germany for stocking purposes during the period 1908-14.

Complete reorganization and reconstruction are necessary to place the British fisheries on a sound footing, for at present the administrative machinery is of appalling complexity, which is particularly unfortunate in the case of an industry where promptness is the chief factor of success. Among the statutory authorities concerned with fisheries in Great Britain are the Ministry of Agriculture and Fisheries, the Admiralty, the Board of Trade, the Ministry of Health, the Foreign Office, numerous English local authorities, and the Scottish Fishery Board. The Fisheries Branch of the Ministry of Agriculture has done extremely good work in the face of extraordinary difficulties, but a distinct Board or even Ministry of Fisheries is badly needed.

Until quite recently there was no unofficial federation or association representing all the numerous interests concerned, though various bodies looked after some of them, but we now have the Association of British Fisheries, incorporated January, 1923. The main objects of the Association are: "To be the centre at which a policy for the fisheries will be determined; to provide an advisory committee that will be consulted by the Government in matters affecting the fisheries; to bring unity and order into fishery organization; to promote education and research work in fishery problems; to encourage invention; to promote the increased production and better distribution of fish in a fresh state to the community; to bring knowledge to the public of the food value of fish and the best method of cooking and serving; and to encourage and assist fishing as a sport."

The greatest difficulty with which fisheries have to contend is due to the exceedingly perishable nature of the goods handled. Freezing, canning, and curing get over this difficulty for a portion of the catch, but only fresh fish can be used as a satisfactory substitute for fresh meat, and to ensure punctual delivery of really fresh fish to inland consumers not only rapid but also accurately co-ordinated means of transport are essential. The home consumption of fish remains fairly steady, but an increase may be expected if and when transport is improved, and probably a demand could be created in small and relatively remote centres of population by employing road motors for this purpose.

It is interesting to know that co-operative methods, well known in connection with agriculture (Part I., p. 130), have been successfully applied to the needs of those engaged in the fishing industry by the Fisheries Organization Society (President, Cecil Harmsworth), founded in 1914, and specially concerned with

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inshore fishermen. The Society was established as the result of a recommendation made in 1913 by a Departmental Committee that had been appointed to consider and report upon the decline of our inshore fisheries.

QUANTITY AND VALUE OF FISH OF BRITISH TAKING LANDED IN ENGLAND AND WALES AND IN SCOTLAND, IRELAND, AND THE UNITED KINGDOM IN 1913 AND 1921.

ENGLAND AND WALES.					
		<i>Wet Fish.</i>		<i>Shellfish.</i>	<i>Total Value.</i>
		<i>Tons.</i>	<i>£.</i>	<i>£.</i>	<i>£.</i>
1913	.. ..	807,619	10,009,326	327,363	10,336,689
1921	.. ..	558,730	15,998,068	558,929	16,556,997
SCOTLAND.					
1913	.. ..	363,366	3,733,379	72,357	3,805,736
1921	.. ..	260,011	4,910,624	102,332	5,012,956
IRELAND.					
1913	.. ..	33,820	294,625	63,922	358,547
1921	.. ..	23,824	360,977	50,199	411,176
UNITED KINGDOM.					
1913	.. ..	1,204,805	14,037,330	463,642	14,500,972
1921	.. ..	842,565	21,269,669	711,460	21,981,129

QUANTITY AND VALUE OF FISH OF BRITISH TAKING LANDED IN ENGLAND AND WALES, 1909-13 (AVERAGE) AND 1922.

		<i>1909-13 (Average).</i>		<i>1922.</i>	
		<i>Tons.</i>	<i>£.</i>	<i>Tons.</i>	<i>£.</i>
Herring	.. ..	260,782	1,662,061	133,841	948,922
Cod	.. ..	122,121	1,315,820	116,298	2,560,653
Haddock	.. ..	99,035	1,277,442	124,919	2,833,321
Plaice	.. ..	45,129	984,454	38,502	2,101,483
Hake	.. ..	37,489	600,388	37,073	1,363,832
Other wet fish	.. ..	157,999	2,641,465	157,292	4,009,619
Total wet fish	.. ..	722,555	8,481,630	607,925	13,817,830
		<i>Numbers.</i>	<i>£.</i>	<i>Numbers.</i>	<i>£.</i>
Oysters	.. ..	24,665,501	77,194	23,666,223	177,285
Crabs	.. ..	5,016,646	56,327	5,163,759	69,189
Lobsters	.. ..	585,006	28,105	703,008	44,826
		<i>Tons.</i>	<i>£.</i>	<i>Tons.</i>	<i>£.</i>
Cockles	.. ..	9,038	18,397	7,821	42,888
Mussels	.. ..	8,047	14,707	5,453	20,485
Other shellfish	.. ..	4,189	33,502	2,829	53,169
Shrimps	3,109	55,339	2,088	65,635
Total shellfish	—	283,571	—	473,477

SURVEY OF THE EMPIRE

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MEN AND BOYS ENGAGED IN SEA-FISHING (ENGLAND AND WALES AND ISLE OF MAN).

	<i>Regular.</i>	<i>Occasional.</i>	<i>Total.</i>
1913	37,870	7,512	45,382
1921	33,363	5,214	38,577

MEN AND BOYS ENGAGED IN SEA-FISHING (UNITED KINGDOM, 1921).

	<i>Regular.</i>	<i>Occasional.</i>	<i>Total.</i>
England and Wales.. ..	32,942	5,024	37,966
Isle of Man	421	190	611
Scotland	26,299	4,463	30,762
Ireland	7,102	6,506	13,608
Channel Islands	375	146	521
Total	67,139	16,329	83,468

UNITED KINGDOM FISH IMPORTS (ALL KINDS).

	<i>Tons.</i>		<i>£.</i>	
	1913.	1921.	1913.	1921.
Landed by foreign boats:				
Deep-sea fisheries ..	36,984	25,796	323,612	1,021,647
Empire	19,248	17,044	1,394,019	2,316,010
Foreign	128,215	98,363	3,169,296	6,179,473
Total	184,447	141,203	4,886,927	9,517,130

UNITED KINGDOM FISH RE-EXPORTS (ALL KINDS).

	<i>Tons.</i>		<i>£.</i>	
	1913.	1921.	1913.	1921.
Empire	4,705	3,741	278,056	320,784
Foreign	22,731	10,121	1,005,243	1,005,974
Total	27,436	13,862	1,283,299	1,326,758

UNITED KINGDOM BRITISH FISH EXPORTS (ALL KINDS).

	<i>Tons.</i>		<i>£.</i>	
	1913.	1921.	1913.	1921.
Empire	14,848	9,511	452,280	585,724
Foreign	535,091	278,810	7,051,188	5,486,024
Total	549,939	288,321	7,503,468	6,071,748

UNITED KINGDOM: IMPORTS AND EXPORTS (PRESERVED FISH) (THOUSANDS OF £).

	<i>Cured or Salted.</i>		<i>Canned.</i>	
	<i>Imports.</i>	<i>Exports.</i>	<i>Imports.</i>	<i>Exports.</i>
1913: Empire	53·6	21·9	1,307·6	255·5
Foreign	436·7	294·5	1,914·1	629·1
1921: Empire	249·4	92·6	2,022·3	226·7
Foreign	559·1	247·2	3,861·7	736·3

GIBRALTAR

The Colony is naturally largely dependent upon imported food. For 1922 the numbers of the chief kinds of livestock were as follows: Horses, 300; mules, 135; cattle, 153; sheep, 172; goats, 250. Meat, milk, butter, table poultry, and eggs are produced to a limited extent for local consumption, and there is a certain amount of sea-fishing.

There are no official statistics of imports and exports.

MALTA

1. LIVESTOCK.—The numbers of the chief kinds of stock for 1913 and 1922 were as follows:

		Horses.	Asses.	Mules.	Cattle.	Sheep.	Goats.	Pigs.
1913	.. ..	3,078	3,327	2,974	4,500	15,493	13,625	4,028
1922	.. ..	2,792	5,076	3,656	5,843	24,789	32,075	6,278

The asses and mules are of high class. Maltese goats are of small size, but vigorous, their health not appearing to suffer from the frequent presence of the germ (*Micrococcus militensis*) of Malta fever in their milk. This disease has been responsible for a very large amount of mortality and serious illness among troops stationed in the island. The germ may also infect cows and sheep. Veterinary measures put in force by the Government are being attended with success, and helping to raise the general standard of health among the human population.

2. MEAT.—The local production is supplemented by imports.

3. DAIRY PRODUCTS.—The outstanding feature is the very large extent to which goats' milk is consumed. There is some import of milk, butter, and cheese.

3. POULTRY AND EGGS.—Local production is adequate.

CHIEF IMPORTS.

		1913-14.	1921.
Cattle	{ Number	10,873	—
	{ £	94,071	156,270
Meat, all kinds	{ Tons	786	305
	{ £	49,630	37,861
Lard	{ £	26,779	44,043
Milk	{ £	16,554	49,510
Butter and butter substitutes ..	{ Tons	398	251
	{ £	34,827	38,355
Cheese	{ Tons	618	307
	{ £	37,738	44,494
Fish of all kinds	{ £	28,817	46,572

ASIA

CYPRUS

1. LIVESTOCK.—The numbers of the chief kinds of stock for 1913 and 1921 were as follows:

	<i>Horses.</i>	<i>Asses.</i>	<i>Mules.</i>	<i>Cattle.</i>	<i>Sheep.</i>	<i>Goats.</i>	<i>Pigs.</i>	<i>Camels.</i>
1913 ..	—	—	—	60,353	256,276	253,106	40,424	1,156
1921 ..	4,368	43,941	11,290	51,536	266,141	169,249	16,765	1,289

Since 1911 much improvement has been effected in livestock, mainly owing to the activity of the Government Stock Farm.

Horses.—The indigenous type is small and active, and may more properly be described as a pony, but other breeds have been introduced to some extent.

Mules and Jennets.—These are largely employed, the former being preferred for harness work and the latter as pack animals.

Asses.—Though of fairly good quality, these have not been improved to the same extent as some other classes of stock.

Camels are used for transport to some extent, but not so much as before great improvements in the roads were effected.

Cattle.—Native Cypriote cattle are not unlike Jerseys in appearance, but are much inferior to them in milking capacity. The demand for beef and cows' milk is comparatively small, and horned stock are mostly used for agricultural purposes.

Sheep.—These are of the fat-tailed kind, resembling some of the Africanders, and derived from the same stock, which is characteristic for Persia and Central Asia.

Goats.—Nothing has been done to improve these or increase their number, partly because they have done much damage to the woods and forests of the island.

Pigs.—The Cypriote breed is of inferior quality and slow to mature. Large blacks have been introduced and have done well.

2. POULTRY AND EGGS.—Considerable improvements in stock have been effected, as part of the general policy of progress in pastoral industries.

3. HONEY.—Apiculture is a very ancient industry in the island, and Cypriote bees have been introduced into many other countries. Though a small strain, they are extremely active as honey-gatherers.

4. FISH.—The fisheries of Cyprus are undeveloped, though marketable marine species abound, including red and grey mullet, bass, bream, tunny, and skate. There are but few fishermen, and their equipment is defective. A moderate amount of fish is caught, but the supply is not equal to the demand. There are extensive cockle-beds on parts of the coast.

There is little to remark about the inland waters, of which eels and freshwater crabs are the leading products. Many of the streams are liable to dry up.

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CHIEF IMPORTS.

		1913.	1921.
Butter and butter substitutes ..	{ Tons	149	39
	£	11,324	10,282
Fish, all kinds (except canned) ..	£	6,425	8,870

CHIEF EXPORTS.

		1913.	1921.
Cattle	{ Number	3,017	—
	£	20,110	—
Cheese	{ Tons	185	—
	£	9,268	—

ADEN AND PERIM

The territory is not self-supporting as regards pastoral products and other foods of animal origin, which are supplemented by imports.

CHIEF IMPORTS.

	1913-14.	1921-22.
Livestock	£50,014	£52,021

THE EMPIRE OF INDIA

1. LIVESTOCK.—The estimated numbers of the chief kinds of stock were as follows for the years indicated:

	Horses.	Asses.	Mules.	Cattle.	Buffaloes.	Sheep.	Goats.	Camels.
1913:								
British								
Provinces	1,534,827	1,363,996	81,027	120,419,817	17,708,636	22,934,232	28,683,730	446,240
Native States	169,421	177,691	(Included with asses)	12,932,135	1,742,536	—	—	52,798
1921:								
British								
Provinces	1,696,746	1,370,614	75,703	116,736,303	28,366,767	22,074,566	24,293,873	409,612
Native States (1920)	431,653	329,079	3,379	24,877,320	6,506,840	12,072,830	7,311,676	157,365

Cattle.—The native cattle of India differ from the European breeds in a number of details, among which the possession of a hump is most striking. There are a number of distinct types, differing in size, the character of the horns, and in some other respects. Cattle are employed for draught purposes as well as for food production.

Buffaloes (*Bos bubalis*).—These are domesticated for the sake of their milk; also as draught animals, and for use in tillage operations.

Sheep.—The domesticated varieties are of various types, among the most remarkable being the fat-tailed sheep, or dumbas.

Goats.—The shawl-goats of Kashmir are the most noted breed, but as these are mainly valued for their under-wool they do not concern us here.

2. MEAT.—This is not an important commodity so far as the native population are concerned, for most of these are not meat-eaters. None of the domesticated animals are of importance for the export trade so far as this is concerned with food products, though hides and skins are valuable commodities.

3. DAIRY PRODUCTS.—Dairying is a considerable native industry, the products including not only milk, but also native butter (ghee) and cheese. The native demand for all these is very large, and breeding experiments are in progress at the Pusa Research Institute, having for their object the establishment of milking strains of cattle, as the average milk-yield is at present very low. The improvement of livestock is a difficult and laborious matter even in a small country, and in the case of India is a colossal task.

Vigorous efforts are being made at various centres to put the dairy industry on a sound footing, and much valuable instruction is given to dairy students. The authorities are fully aware of the importance of improved livestock, proper housing, suitable rations, milk-recording, cleanliness in milking and other operations, and businesslike distributive methods. All these matters are receiving continuous attention.

A considerable trade in tinned butter has arisen in Gujrat (Bombay Presidency). Condensed milk and canned products of similar character are largely imported for consumption by the European part of the population.

4. POULTRY AND EGGS.—Indian jungle-fowl represent the original stock from which domesticated breeds have been derived, so it is not surprising to find ordinary poultry well represented throughout the sub-continent, where they and their eggs form staple articles of diet. As in the case of the larger kinds of livestock much remains to be done, by way of selective breeding, for the production of strains of higher economic value.

5. HONEY.—Bee-keeping as an industry is comparatively undeveloped, but a great deal of honey is produced for local consumption.

6. FISH.—Indian fisheries, especially the sea-fisheries, are comparatively undeveloped, though Madras has set a good example in this respect, which other parts of India are beginning to follow. Progress has been retarded by the caste system, and fishing and its associated industries have been relegated to those of low caste. Fish, however, is an important article of food, for which the demand is increasing, and improved transport facilities are beginning to promote the development of this branch of food production.

Madras Fisheries.—The Fisheries Department is actively engaged in furthering advances in a number of directions. Not only are improvements in methods of capture being introduced, but also in curing, while a cannery for experiment and demonstration has been established at Chaliyam (South Malabar), an oyster farm is being developed, and the possibilities in the direction of deep-sea fishing are under consideration.

The *Madras sea-fisheries* are at present of coastal character, and their activities are restricted by scarcity of suitable harbours and the primitive nature of the craft employed. The fishes of greatest importance are sardines and mackerel, cat-fish and jew-fish coming next. During the season the catch of sardines is much in excess of the demand, and the surplus is used for oil and manure production. There are about 140 curing yards on the Madras coast, which handle over 50,000 tons of wet fish every year.

The inland fisheries of Madras are in a more backward condition, and the fact that many of the streams dry up during the hot season is a great obstacle to progress, one result being a dearth of fresh-water fish for a large part of the year. The chief species are murrel, carp, cat-fish, hilsa, and catla. Rainbow trout have been successfully introduced and there is a Government hatchery.

Fisheries of Bengal, Bihar and Orissa.—These were formerly under the same administration, but fishery interests in Bihar and Orissa are now in charge of the Department of Industries for that province, and there is a special Fisheries Department for Bengal. The latter is more restricted in its efforts than that of Madras, and at present is largely concerned with improving the status and dealing with the grievances of those engaged in the industry. It is estimated that 1.6 per cent. of the population are engaged in fishing and the allied occupations, there being 644,000 fishermen in Bengal and 324,000 fish-sellers. There is a great demand for fish, which is a staple article of food for some 80 per cent. of the population.

The industry is here mainly carried on in a very extensive region occupied by the combined delta of the Ganges and Bramaputra, intersected by innumerable streams and teeming with fish. Hilsa is the most important fresh-water species, while rohu and catla are also taken in large numbers. Of estuarine types bekti and mullets are most prominent, the chief coastal forms being mango-fish and mullets. Later on it may prove possible to establish trawling in the deeper waters off the Bengal coast.

The *Burma fisheries* are mostly inland, those on the coast being undeveloped. The *Punjab* has a Fisheries Department, and there are effective regulations controlling its waters. *Travancore* has made some advances in fishery development.

Bombay Fisheries.—The Fisheries Department is actively promoting extension of the industry, where there is much room for development. This is favoured by the existence of better harbours than those of the east coast. The fisheries are mostly marine, and the chief species caught are pomfrets, soles, sea-perches, jew-fish, and bombil. The sounds of jew-fish are valued as a source of isinglass, and dried bombil constitutes the commodity well known as "Bombay duck." Many of the fishing craft are of comparatively superior kind, and some of these catch bonito and seer in off-shore waters. Experiments in canning are being made at a centre in South Kathiawar, and pomfrets furnish promising material in this direction.

CEYLON

1. LIVESTOCK.—Ceylon has specialized in the production of crops and raw material of vegetable nature to the neglect of pastoral industries.

The numbers of the chief kinds of stock for 1913 and 1922 were as follows:

		<i>Horses.</i>	<i>Cattle.</i>	<i>Sheep.</i>	<i>Goats.</i>	<i>Pigs.</i>
1913 ..	..	5,043	1,484,306	90,010	203,386	85,641
1922 ..	..	2,000	1,499,800	56,200	150,000	49,800

Cattle.—These consist of animals belonging to the native breed, together with cross-bred stock and various imported types. They are used for draught purposes as well as for beef and milk production.

Buffaloes.—Some of these are imported for dairying purposes. Those native to the colony are employed in various agricultural operations, and also slaughtered for food.

Sheep, goats, and pigs are mostly kept for meat production, but it has been suggested that goat-keeping should be encouraged in order to augment the supply of milk.

A considerable number of live animals are imported, chiefly from India.

The inadequacy of the pastoral industries is generally recognized, and a forward movement is being made with regard to the improvement of livestock, the prevention of disease, and the provision of communal grazing grounds.

2. MEAT, and 3. DAIRY PRODUCTS.—Local supplies are supplemented by considerable imports of frozen and canned meats, and dairy products.

4. POULTRY AND EGGS.—The poultry industry has been little developed, but is likely to be benefited by the advances proposed for improving livestock in general.

5. HONEY.—Statistics of production are not available.

6. FISH.—The sea-fisheries are in a somewhat primitive condition as regards craft and methods of capture. The number of boats engaged in 1922 was 8,177. The coastal waters abound in edible species of fish, which are captured in some quantity, a considerable proportion of the catches being packed in ice for sale in Colombo and other large centres. The surplus is dried or preserved in some other way. Local supplies are unable to satisfy a growing demand, and fish, in various forms, are imported to some extent.

Oysters are to be found all round the coast, and are in some demand by the European population, though not eaten to any extent by the natives. A *bêche-de-mer* fishery exists, but this has greatly declined of late years. Its revival might prove a profitable enterprise.

Considerable development of the Ceylon fisheries is possible and desirable. With reference to this possibility experiments and investigations have been made by the Marine Biological Survey. This has discovered valuable trawling grounds with an area of over 3,000 square miles. It is also believed that drift-net fishing would prove a success.

CHIEF IMPORTS.

		1913.	1921.
Cattle	{ Number	20,891	13,643
	{ £	28,202	29,867
Sheep and goats	{ Number	142,207	56,923
	{ £	47,450	37,949
Fish, cured or salted	{ Tons	13,598	14,812
	{ £	148,892	277,914

BRITISH MALAYA

1. LIVESTOCK.—The statistics available, though very incomplete, justify the conclusion that the number of the various classes of livestock must be very considerable. The Straits Settlements alone, in 1913, had the following animal population: horses, 2,320; cattle, 46,094; sheep, 59,994; goats, 12,987; pigs, 157,542. The estimated number of cattle in the Malay States (not including Johore) was 193,692, and the number of buffaloes (not including Kedah, Kelantan, and Trengganu) 69,879.

2. MEAT AND DAIRY PRODUCTS.—Though the smaller livestock represent a considerable amount of food, the cattle are more valuable for draught purposes than for slaughter, and native labour is very largely attracted to occupations offering larger remuneration than agriculture or the pastoral industries. As one result of this the population is dependent upon imported food to a great extent, condensed milk and provisions of various kinds constituting important items.

3. POULTRY AND EGGS.—Although these are produced to some extent for local consumption, there is no organized poultry industry.

4. FISH.—In Malaya, as in rice-eating countries generally, fish is a staple food. The sea-fisheries are an important industry, and the output is considerable, though the methods employed are primitive. Some hundreds of tons of prime fish are captured annually on the east side of the Malay Peninsula, but are for the most part dried owing to the absence of cold storage transport. The coastal forms of most value are pomfrets, flat-fish (about twenty species), mackerel, horse-mackerel, herrings, shad, sea-perches, sea-bream, and jew-fish. Bonito, tunny, and Spanish mackerel are among the species caught further off shore.

Horse-mackerel are the chief fish used for drying and salting, jew-fish are preserved in this way to serve as an ingredient in curries, and shad roes are dried and salted as a delicacy.

STRAITS SETTLEMENTS: CHIEF IMPORTS.

		1913.	1921.
Cattle	£	265,728	277,874
Pigs	£	284,631	249,551
Lard	{ Tons	4,598	1,734
	{ £	204,317	109,599
Milk, condensed	£	459,001	1,036,448
Fish, dried and salted	£	1,398,540	1,996,056

SURVEY OF THE EMPIRE

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STRAITS SETTLEMENTS: CHIEF EXPORTS.

	1913.	1921.
Fish, dried and salted	£1,090,150	£2,416,189

FEDERATED MALAY STATES: CHIEF IMPORTS.

		1913.	1921.
Cattle	{ Number	17,718	4,482
	{ £	151,891	57,138
Pigs	{ Number	59,736	25,169
	{ £	176,293	103,832
Milk, condensed and skimmed	{ £	152,496	247,526
Fish, all kinds	{ £	165,310	123,605

FEDERATED MALAY STATES: CHIEF EXPORTS (DOMESTIC PRODUCE).

	1913.	1921.
Fish, all kinds	£30,803	£43,225

NON-FEDERATED MALAY STATES: JOHORE (CHIEF IMPORTS).

		1914.	1921.
Animals, living	{ £	9,512	29,084
Milk, condensed	{ £	13,162	70,714
Fish	{ Tons	814	913
	{ £	26,005	57,551

NON-FEDERATED MALAY STATES: TRENGGANU (CHIEF EXPORTS).

		1913.	1921.
Fish, dried or salted	{ Tons	4,529	4,578
	{ £	78,563	116,869

BRITISH NORTH BORNEO: CHIEF IMPORTS.

	1913.	1921.
Provisions	£48,470	£75,087

BRITISH NORTH BORNEO: CHIEF EXPORTS.

		1913.	1921.
Dried fish and shellfish	{ Tons	1,864	1,030
	{ £	18,774	22,097
Edible birds' nests	{ Tons	25	25
	{ £	7,381	13,609

BRUNEI: CHIEF EXPORTS.

		1915.	1921.
Animals, live	{ Number	—	2,263
	{ £	340	4,000

SARAWAK: CHIEF EXPORTS.

		1913.	1921.
Fish	{ Tons	648	381
	{ £	16,483	18,508

HONG KONG

The pastoral resources of the Colony are small, and European residents largely depend on imported food. There is, however, a dairy farm of 300 acres, established at the suggestion of the late Sir Patrick Manson. About 900 head of dairy-cattle (including over 40 bulls) are kept, and the stock has been built up from Ayrshire and Friesian strains. The dairy equipment is thoroughly up-to-date, cream and butter being the chief products, also soft cheeses.

Fisheries are of some importance. "A considerable proportion of the boat population of Hong Kong supports itself by deep-sea fishing, in which pursuit a large number of junks are engaged. The villages of Aberdeen, Stanley, Shaukiwan, and also many in the New Territories, are largely dependent upon this industry for their prosperity. Fresh-water fish is imported from Canton and the West River. There are oyster beds of considerable value in Deep Bay." (Colonial Report for 1921, p. 9.)

The pastoral industries of the New Territories are developed sufficiently for local needs.

WEIHAIWEI

The pastoral industries are of little importance, and the European inhabitants largely rely on imported animal foods. Eggs are among the exports.

The fisheries are of local importance, and there is some export of salted fish to South China.

AFRICA

EGYPT

1. LIVESTOCK.—For 1913 and 1922 the numbers of the chief kinds of stock were as follows:

		<i>Horses.</i>	<i>Asses.</i>	<i>Mules.</i>	<i>Buffaloes.</i>	<i>Cattle.</i>	<i>Sheep.</i>	<i>Goats.</i>	<i>Pigs.</i>	<i>Camels.</i>
1913	..	47,911	682,061	23,293	632,725	637,098	816,184*	331,016*	7,259†	118,414*
1922	..	34,942	613,726	20,892	616,487	584,823	941,695	394,864	18,453	130,640

* 1914.

† 1915.

Horses are of most types, but the heavy breeds are not represented, as oxen are employed for agricultural purposes.

Asses.—The small black Beladi breed is commonest in Lower Egypt, while the Hascovi, or large white Syrian donkey, predominates in Upper Egypt.

Mules are imported from Syria.

Cattle.—These are of the humped type and vary greatly in quality, some being large and strong while others are very poor. Little has so far been done by way of improvement, and a special milking strain has not been developed. The combating of disease has received a good deal of attention, and the Serum Institute has helped materially in keeping cattle plague (rinderpest) under control.

Buffaloes are the most important milking stock, and are also used in agricultural operations and for meat production. They have not been improved by selective breeding.

Sheep.—These are of the fat-tailed race. The chestnut-faced Morain breed, in which the ewes are hornless, is favoured in Lower Egypt, while black Saidi sheep, with less developed tails, are more typical for Upper Egypt. Sheep might well be kept in larger numbers, as the grazing costs nothing and the outlay on purchased foods is relatively small.

Goats.—The small Beladi breed is most abundant, and the large Syrian type—Zaraiby—is also common.

Camels are valuable for production of milk and meat, as well as for transport purposes.

2. MEAT.—The local consumption is considerable. In 1920, for example, the slaughter figures for the public abattoirs were as follows: cattle, 54,470; calves, 127,940; buffaloes, 25,997; camels, 6,647; sheep, 568,219; goats, 66,024; pigs, 27,642. In the case of cattle and sheep a considerable proportion of the slaughter stock are imported from the Sudan.

3. DAIRY PRODUCTS.—As already mentioned, buffaloes are the most important kind of milking stock, cows coming next, and goats' milk being also largely

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consumed. Camels' milk is consumed to some extent, but the individual yield is small.

4. POULTRY.—The poultry industry is not in a satisfactory state, both production and distributive methods needing proper organization. The native fowls, though hardy, are small and ill-nourished, and the eggs are also of small size. Considerable quantities of Egyptian eggs are exported, but there has been a good deal of criticism with regard to their quality.

5. FISH.—A good deal of fish, both fresh and preserved, is consumed locally, but Egyptian fisheries have not been developed to any large extent.

CHIEF IMPORTS.

			1913.	1921.
Butter	..	..	874	256
		{Tons	89,352	58,112
		{£	2,847	1,542
Cheese	..	..	202,218	291,417
		{Tons		
		{£		

CHIEF EXPORTS (DOMESTIC PRODUCE).

			1913.	1921.
Eggs	..	..	148,571	91,801
		{Thousands	258,518	348,627
		{£		

SUDAN

1. LIVESTOCK.—There are vast numbers of cattle, sheep, and goats, but in the absence of complete statistics it will only be possible to make a few general statements. In his Annual Report for 1921 the Director of the Central Economic Board assesses the number of mature cattle in the Kordofan Province at 250,000, and at 134,000 in the White Nile Province, while there are "vast herds" so far untouched by trade in the Bahr el Ghazal Province. The sheep and goat populations are on a similar scale, and there are also a great number of horses, asses, mules, and camels.

There is, as might be expected, much room for improvement of stock and the conduct of an intensive campaign against stock diseases.

2. MEAT.—There is a large export trade with Egypt in slaughter stock, though this has fallen off to some extent since 1920, partly because the cotton crisis in that country led to the forced slaughter of native stock. During the six years 1914-19 the numbers exported to Egypt were: cattle, 126,000; sheep and goats, 690,000. Exports to Egypt also include a small amount of dried meat. There are undeveloped possibilities of overseas export, and Palestine is particularly mentioned as a country that may import Sudanese stock in the future, though efforts in this direction have so far been without result.

3. DAIRY PRODUCTS.—There is a small export trade in butter and ghee, but the import of these commodities is somewhat larger. It will no doubt ultimately be possible to increase production and effect improvements in the native method of butter-making.

4. FISH.—Considerable quantities of dried fish are exported to Egypt.

CHIEF EXPORTS (DOMESTIC PRODUCE).

		1913.	1921.
Cattle	Number	10,532	16,719
	£	76,608	206,869
Sheep and goats .. .	Number	99,174	53,131
	£	99,587	136,435

GAMBIA

The resources of the Colony and Protectorate are quite undeveloped so far as the pastoral industries and fisheries are concerned. Large herds of cattle are kept by the natives, but these are chiefly important in connection with the export of hides. Considerable quantities of fish are caught and dried for local consumption.

SIERRA LEONE

There is here little to remark. Although cattle are numerous they are of poor quality, and the prevalence of diseases presents a formidable obstacle to advance of the stock-keeping industry. As elsewhere on the West African coast, fish are caught for local consumption.

CHIEF IMPORTS.

	1913.	1921.
Provisions (including bacon, ham, beef, and pork)	£39,982	£34,584

GOLD COAST

(GOLD COAST COLONY, ASHANTI, AND NORTHERN TERRITORIES).

1. LIVESTOCK.—The following figures, which can only be regarded as a very rough approximation, were returned by the Census of 1921:

	Horses.	Asses.	Cattle.	Sheep and Goats.	Pigs.
Gold Coast Colony ..	210	1	7,542	85,100	12,347
Ashanti	12	162	637	10,173	2,176
Northern Territories ..	2,394	8,905	60,070	233,534	63

Horses.—These are from Northern Nigeria, and are mostly imported from Lagos. They do well at Elmina, Accra, and on the eastern part of the coast towards Togoland, but at Cape Coast and some other places die immediately after importation. A few are bred beyond the fly-belt in the Northern Territories, where there is a Veterinary Farm at Tamala.

Asses.—Like horses, these animals are subject to fly-borne disease (trypanosomiasis), and are but rarely bred in the Colony or the forest region of Ashanti.

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They are, however, raised in some numbers in the Northern Territories, and to some extent in North-West Ashanti, and are largely employed as pack animals.

Mules are found useful for town transport.

Cattle.—The non-humped type is bred on the coast and in North-West Ashanti, and to this type also belong the Dagomba cattle of the Northern Territories, which are not unlike Jerseys in appearance, and though smaller than the humped Moshie breed surpass these for meat production. The natives make no attempt to improve their cattle by selective breeding, nor to isolate infected animals, and epidemics of cattle plague (rinderpest) and pleuro-pneumonia are frequent in the Northern Territories. The Dagomba cattle have not yet competed to any great extent with the Moshie cattle imported from the French territories.

In the dry season large numbers of cattle and other livestock from the Northern and French Territories are taken to the market at Coomassie, to be transported to the coast towns and mining areas. The figures, for cattle, in 1913 and 1921 were as follows:

				<i>Humped Cattle</i> (<i>Moshie</i>).	<i>Non-Humped Cattle</i> (<i>Dagomba</i>).	<i>Total.</i>
1913	..	..	..	13,249	814	14,063
1921	..	..	..	617	3,388	4,005

The decrease in Moshie for 1921 was due to an epidemic of rinderpest in the French territories.

The Government Veterinary Department has made a beginning in the direction of bullock transport, a number of Dagomba oxen having been broken to the yoke.

Sheep are plentiful throughout the country. The coast breed is relatively small and compact, but with a large proportion of bone.

Goats are abundant in some districts, such as the Addah-Quittah. Both sheep and goats figure largely in the Coomassie market during the dry season.

Pigs are bred and reared in the Addah-Quittah district for the Accra market.

2. MEAT, and 3. DAIRY PRODUCTS.—From what has been said under the last heading, it will be seen that there is a considerable local production of meat, but the dairy industry has not been organized. As in similar cases, a good deal of animal food is imported for consumption by the white population.

4. POULTRY AND EGGS.—Poultry are abundant in some districts, and considerable numbers are brought to the Coomassie market, together with the larger kinds of livestock. There is no organized poultry industry.

5. FISH.—There is a great deal of coastal fishing, and large supplies of dried fish are sent up country. The chief kinds are mackerel, herring, barracouta, sole, skate, garfish, mullet, sea-bream, and eels. Crayfish and crabs are also abundant.

Fresh-water fishes, among which cat-fish are most esteemed, are plentiful in the rivers and lagoons, and there are beds of fresh-water oysters in the Volta and its larger tributaries. Ashanti mostly gets its supplies of such fish from the Volta and Prah rivers, and from Lake Bosumbwi.

NIGERIA

1. **LIVESTOCK.**—The estimated numbers of the chief kinds of stock were as follows in 1921: horses, 173,638; asses, 484,329; cattle, 2,824,228; sheep, 1,909,096; goats, 4,006,875; pigs, 43,789; camels, 3,928.

Asses, oxen, and camels are used for transport purposes in the north.

Cattle.—Those of the Northern Provinces are of reasonable quality, but too much inbred. The Southern Provinces cattle are smaller and of little use for milk production, but have the advantage of being largely immune to trypanosome disease, which is disseminated by tsetse flies over certain areas.

It is possible that ranching may become an important industry in the future, though there are many difficulties in the way. Animal diseases are prevalent and Government Veterinary Officers are appointed. Grazing is plentiful in the Northern Provinces during the rainy season and for about two months afterwards, but during the remainder of the year cattle often have to be driven for long distances to secure water and pasturage.

2. **MEAT.**—There is a Cold Storage Company in Lagos, the beef handled by which is the produce of the Northern Provinces.

3. **DAIRY PRODUCTS,** and 4. **POULTRY AND EGGS.**—Neither the dairy nor the poultry industry has been organized.

5. **FISH.**—Fisheries have not yet been developed in Nigeria. The rivers and estuaries are fished by the natives, but their catches for the most part are consumed locally. Before the War large quantities of excellent fish were captured off Lagos by a steam trawler.

CHIEF IMPORTS.

				1913.	1921.
Fish	..	..	{ Tons	4,549	2,227
			{ £	134,998	130,217

ST. HELENA

Food of all kinds is imported to a relatively large extent, as the resources of the island are limited. For 1921 the numbers of the chief kinds of livestock were, however, larger than might have been expected, as follows: horses, 135; asses, 1,123; mules, 14; cattle, 1,042; sheep, 2,981; goats, 1,432; pigs, 214. Fresh meat, together with dairy and poultry commodities, are produced in the island for local consumption, and sea-fish of various kinds are abundant.

CHIEF IMPORTS.

					1913.	1920.
Beef and pork	..	..	..	..	£852	£641
Butter and margarine	..	..	..	..	£1,662	£1,884

ASCENSION

This small but strategically important part of the Empire relies almost entirely upon imported food. There are small numbers of cattle and sheep, wild goats and rabbits are abundant, and poultry are kept for production of table birds and eggs. Sea-fish are plentiful, and the island has acquired a considerable reputation for the export of turtles.

UNION OF SOUTH AFRICA

1. LIVESTOCK.—The numbers of the chief kinds of livestock for 1911 and 1921 were as follows:

	<i>Horses.</i>	<i>Mules.</i>	<i>Asses.</i>	<i>Cattle.</i>	<i>Sheep.</i>	<i>Goats.</i>	<i>Pigs.</i>
1911 ..	719,414	93,931	721,656	5,796,949	21,842,215	11,762,979	1,081,600
1921 ..	920,110	116,269	336,710	8,557,089	27,757,213	7,836,696	914,769

Horses.—Large areas of the Union are very suitable for horse-breeding, and it may be said that horses thrive where the conditions are favourable for sheep. They are somewhat small in size, and this has been attributed to deficient nutrition of young stock during the winter and prolonged droughts. The present tendency is to breed from heavy sires with the idea of increasing size and establishing a general utility type.

Asses, of Andalusian stock, were imported into South Africa at a very early period from the Cape Verde Islands, and are now numerous in all parts of the Union. Mule-breeding is an old-established industry, which appears to have originated in the demand for swifter draught animals than oxen among the grain farmers of the Malmesbury district.

Native *cattle* were at first utilized by settlers, and from this stock is derived the hardy Afrikaner breed, which as a draught animal has played a conspicuous part in the development of South Africa. Friesians were the first European breed to be introduced, to be followed, at a much later period, by various British breeds.

Sheep.—The Union of South Africa is the fourth country in the world in respect of the size of the sheep population, being only surpassed by Australia, Argentina, and the U.S.A. Next to the Union come the United Kingdom, New Zealand, and British India.

Most of the *goats* are of native stock, which has been much improved, but there are also a large number of Angoras, introduced into the country in order to establish a mohair industry.

Pigs cannot be regarded as numerous in proportion to the size of the country.

2. MEAT—*Beef.*—During the last few years the meat trade of the Union has been the subject of enquiry by Government Commissions, and there has been a certain amount of reorganization of the internal meat market and the important export trade. A Meat Producers' Exchange was established in Johannesburg,

its membership embracing farmers in all parts of the Union, and its principles being of co-operative character.

In view of the importance of the meat industry much has been done during recent years towards improving various types of cattle for beef production. The fact that meat must be inspected and graded before export encourages activity in this direction. Here, and in all other matters relating to pastoral production, the Department of Agriculture furthers progress as it does in the case of crops (Part I., pp. 138-139).

Among the British beef breeds whose interests are promoted by Breed Societies are Shorthorns, Herefords, and Aberdeen-Angus, but it must be understood that the great majority of South African cattle are of mixed blood, the native strains predominating.

Mutton.—Sheep are of most importance for wool production, but considerable attention is also being paid to the production of mutton. Before the War the Union relied very largely on imported mutton, but importation sank to very small proportions during the War, and though it has since increased there seems every prospect of the Union not only providing for its own needs, but also producing an increasing surplus for exportation.

Bacon, Ham, and Lard.—The pig industry is in course of development, and the exports of bacon, ham, and lard, which were very small before the War, are now considerable. A good deal has been done to raise the standard of the bacon pig by systematic breeding and feeding, but large extension of this kind of work is necessary, for steady expansion of the industry depends on the supply of suitable animals. The chief breeds, in order of popularity, are Large Blacks, Berkshires, Tamworths, and Middle Whites, but most of the pigs in the Union are of unsatisfactory type. The establishment of an increasing number of farmers' co-operative bacon factories promises well for the future.

3. DAIRY PRODUCTS.—Before the War the Union very largely relied on imports of butter and cheese, and the reduction of these during the War naturally led to increased local production, thus laying the foundation of a dairy industry which is able to carry on a thriving export trade.

Friesians and Ayrshires appear to be the most popular imported breeds, but there are also large numbers of Jerseys, Dairy Shorthorns, South Devons, and Red Polls. Most of the dairy herds are cross-bred, the predominating strain in these being either Shorthorn or Friesian. The importance of milk-recording is fully recognized.

At the end of 1921 there were 71 creameries, 49 cream-collecting depôts, 131 cheese factories, and numerous privately owned cheese-making establishments. The two chief types of cheese are Cheddar and Gouda. Both butter and cheese are graded for export.

4. POULTRY AND EGGS.—Poultry-keeping as a distinct industry remains to be developed in the Union, though it exists almost universally as an adjunct to farming. The activities of the Agricultural Department, of Poultry Societies, and other organizations are effecting many improvements in stock and in methods. Co-operative egg-collecting circles are effectively promoting the industry, especially where it is associated with creameries, and two large co-

operative businesses dealing with poultry products have been established. Before the War the Union largely depended on imported eggs, but production has been increased to such an extent that after meeting local needs there is a considerable surplus for export.

5. HONEY.—Bee-keeping is at present a minor industry, and the production of honey does not meet the local demand. There would appear to be considerable possibilities by way of expansion, especially as the importation of honey is forbidden.

6. FISH.—The progress of sea-fisheries for the Cape Province and Natal has been handicapped by the small number of natural harbours available for fishing craft, and also by the superior claims of land industries. In 1895 the Government of the Cape Colony, realizing the undeveloped condition of the Cape fisheries, instituted systematic investigations on the subject, under the direction of the Department of Agriculture. Trawling was found to be by far the most promising direction of expansion, and some valuable trawling grounds were discovered, especially on the Agulhas Bank, where soles of high quality abound. These grounds were consequently exploited, and as a result the supply of fish was greatly increased. A new fisheries survey was initiated in 1920, and important results have already been secured.

From 1884 up to the present time Natal has taken considerable interest in fishery matters, as shown by a good deal of special legislation, the appointment of commissions, and the conduct of investigations. A Natal Fisheries Department was established at the end of 1921, with the Principal Fisheries Officer as Secretary.

That part of the fishing industry dealing with shellfish is of no great importance, though there is no lack of crayfish, crabs, prawns, and shrimps in African waters. Great advances, however, have recently been made by the Cape Province in canning crayfish, and an extensive export trade in this commodity is carried on. The supply of African rock oysters has become much depleted, but there seems no reason why oyster culture should not be established on a commercial scale.

In 1920 there were fifteen factories, each canning about a million crayfish annually.

Comparatively little has been done with regard to developing inland fisheries in the Union. The indigenous fish fauna is in many cases poor, but carp and trout have been successfully established in many of the rivers of the Cape Province, Natal, and the Transvaal.

Some of the South African sea-fish are well adapted for curing or tinning, and there would appear to be a future for this kind of enterprise. "It has been demonstrated on a small scale that some of these fish are well adapted to the process of smoking, and they would undoubtedly compete satisfactorily with the great quantities of imported smoked fish with which the South African market is supplied. . . ." "Of the smaller migratory fish neither the *herring* or *sardine*, nor the *anchovy*, is put on the South African market, which is flooded with tinned sardines, smoked herrings and haddocks, and other European fish" (*Official Year Book*, No. 5, 1922, p. 564).

THE TERRITORY OF SOUTH-WEST AFRICA

Except for a coastal strip the Territory is well adapted to pastoral pursuits, and when its natural resources are fully developed should take a prominent place among the South African Provinces in respect of cattle-ranching and sheep-farming. The area of rich natural pasturage is large, and could be greatly extended by utilizing the unlimited supply of underground water. The stock are remarkably free from tick-borne diseases, and dipping is considered unnecessary.

The livestock are of relatively high grade, owing to the policy of the German Government in introducing pure European breeds. Not only is the local demand for beef and mutton met by production, but the Territory supplies cattle and other stock to the meat trade of the Union.

The fisheries are in an undeveloped condition, but for some years a number of cutters making their headquarters at Walvis Bay appear to have made considerable profits by catching snoek (the same fish as the barracouta of Australia), which is dried and marketed at Cape Town. Four crayfish canneries have been established at Luderitz.

CHIEF SOUTH AFRICAN IMPORTS.

		1913.	1921.
Meat, canned, etc. (including soups)	{ Tons	1,756	239
	{ £	144,811	36,436
Bacon and hams	{ Tons	2,762	154
	{ £	264,429	29,194
Milk, condensed, etc. ..	{ Tons	10,115	3,251
	{ £	464,886	65,019
Butter	{ Tons	1,738	170
	{ £	188,471	30,112
Cheese	{ Tons	2,494	22
	{ £	167,440	4,944
Fish, dried, cured, or preserved	{ Tons	5,240	2,599
	{ £	283,371	211,394

CHIEF SOUTH AFRICAN EXPORTS (DOMESTIC PRODUCE).

		1913.	1921.
Beef and veal, fresh or frozen	{ Tons	54	943
	{ £	3,161	46,463
Eggs	{ Thousands	1,479	20,832
	{ £	8,545	180,389
Fish, dried or preserved ..	{ Tons	2,080	2,416
	{ £	103,029	230,254

BASUTOLAND

That part of the country suitable for the pastoral industry is at present overstocked. There is an export trade in live animals.

BECHUANALAND PROTECTORATE

The livestock resources of the Protectorate are not inconsiderable. Under strict regulations designed to prevent the spread of contagious animal diseases, live cattle, etc., are exported to the Union, but no official statistics are kept.

SWAZILAND

This is a fine country for cattle-ranching, and by means of compulsory dipping East Coast fever and other tick-borne diseases are successfully controlled. The local cattle are of good quality for meat production, and experiments are in progress to determine which of the European breeds are most likely to effect improvement by crossing. Export of cattle to the Union is prohibited, except for slaughter purposes, the number of animals so exported being 3,649 for the year 1920. Good prices are realized in winter and early spring, at which seasons the cattle are in prime condition. There appear to be possibilities of establishing a considerable dairy industry. About 300,000 Union sheep come into Swaziland every year for winter grazing.

RHODESIA

I.—NORTHERN RHODESIA.

The Territory is still under the administration of the South Africa Company, and is much less developed than Southern Rhodesia. Large tracts are suitable for white settlement, and there is abundant scope for cattle-ranching and mixed farming. A considerable area, however, is infested by tsetse flies, and as these pests disseminate the germs of sleeping sickness among human beings and those of allied diseases among livestock, the possibilities of development in the future depend on the progress of scientific research.

1. LIVESTOCK.—Herds of cattle and flocks of sheep and goats are being improved and built up on similar lines to those adopted in Southern Rhodesia (p. 45). There is abundant natural forage for pigs, which are fattened on maize and millet.

2. MEAT.—The main line of railway is extended into the Katanga copper-mining district in the south of the Belgian Congo, which affords profitable markets for slaughter stock, in addition to those dealing with local consumption. As further railway extensions materialize new markets will be opened up, and it is anticipated that the eastern part of the Territory will ultimately possess through railway connection with Beira via Nyasaland.

3. DAIRY PRODUCE, POULTRY AND EGGS.—There are considerable possibilities for the dairying and poultry industries, but these await development.

CHIEF EXPORTS (DOMESTIC PRODUCE).

				1913.	1921.
Cattle	..	..	Number	3,835	10,022
			£	25,058	90,556

II.—SOUTHERN RHODESIA.

This Colony offers unlimited possibilities for cattle-ranching and other branches of the pastoral industry to those possessed of reasonable capital, from £2,500 to £3,000 being the minimum. Remarkable progress is being made in the extension of railways and other means of communication, and the export trade will be greatly facilitated by the arrangements now concluded with the Portuguese Government for the use of Beira as a port. The climate is one of the best in the world, making the country particularly suitable for white settlement.

1. **LIVESTOCK.**—The numbers of the chief kinds of livestock in 1921 were as follows: horses, 3,438; asses, 23,016; cattle, 1,750,538; sheep, 331,273; goats, 802,189; pigs, 65,219.

Many of the British breeds of livestock thrive in the Colony, and numerous pedigree animals are imported.

Cattle.—As native cattle are hardy and mature early, it has been found sound policy to make a beginning with herds of native cows, gradually improving the stock by the use of pure-bred or grade bulls of suitable British race. Oxen are employed for tillage and other agricultural operations. Permits for movement of stock are obtained from district Cattle Inspectors. The cattle market at Johannesburg provides facilities for disposal of surplus animals.

Sheep.—The native breed is universally distributed, and this is being improved by the use of pedigree rams. The pasturage suitable for wool production extends as the coarser grasses are reduced by continued grazing.

Goats.—Animals of native breed are twice as numerous as sheep, but a much smaller proportion are owned by settlers.

Pigs.—Properly selected breeds do well if skilfully managed. They pay best when associated with dairying. Maize, the staple grain of the Colony, gives good results in pig-feeding. The Rhodesian Farmers' Co-operative Industries, Ltd., has established a bacon factory, and the various pig products turned out find easy disposal throughout the Colony.

2. **MEAT.**—One result of agricultural co-operation has been the establishment of a meat-canning factory at Odzi, on the Umtali railway line.

3. **DAIRY PRODUCTS.**—Dairying is a promising branch of the pastoral industry in centres where railway transport and local markets are available. At present Southern Rhodesia is largely dependent on imported dairy products, but is expected to become self-supporting in the course of time. The co-operative association already mentioned has established a central creamery at Gwelo.

4. **POULTRY AND EGGS.**—Poultry-keeping is a remunerative industry when carried on as an adjunct to general farming, and is in course of development. At present, however, there is a considerable import of eggs.

CHIEF EXPORTS (DOMESTIC PRODUCE).

		1913.	1921.
Cattle for slaughter	{ Number	—	8,965
	{ £	—	77,119

KENYA COLONY AND PROTECTORATE

1. LIVESTOCK.—The numbers are roughly estimated as follows (*International Year Book of Agricultural Statistics*, 1922; *East African Red Book*, 1922-23, p. 183).

			Native.	European.	Total.
Cattle	..	..	1,450,000	137,000	1,587,000
Sheep	..	..	2,500,000	100,000	2,600,000
Pigs ..	..	..	—	15,038	—

To these must be added (totals): goats, 3,368,853; camels, 101,737.

The natives, especially the Masai, own large herds and flocks, the total value of these being assessed at £6,000,000, while the stock owned by Europeans is estimated at half that figure.

The Agricultural Department controls research laboratories and several Experimental Farms, one of which (at Naivasha) is specially concerned with stock, rearing pure-bred and grade animals and selling these to settlers at an annual sale. Pedigree Friesian and Shorthorn cows have been imported, and a beginning has been made with the breeding of horses and mules. Angora goats have been successfully introduced.

Until recent years the development of the stock industry in East Africa was prevented by the great prevalence of tick-borne diseases, but it is now possible to combat these by dipping and other methods, and work in this direction is carried out by the Kenya Veterinary Department. A large and well-equipped laboratory has been established at Kabete, where stock diseases are investigated and sera and vaccines prepared.

2. MEAT AND DAIRY PRODUCTS.—The demand for meat, milk, etc., is partly met by local production, but considerable amounts of various food-stuffs of animal origin are imported for the use of Kenya and Uganda. Although a certain number of live animals are exported, the chief export value of stock is in connection with the trade in hides and skins.

3. FISH.—Sea-fish of numerous kinds abound on the coast, and these are utilized as food to some extent, but there are no organized fisheries.

The imports and exports of Kenya and Uganda are returned together.

KENYA AND UGANDA: CHIEF IMPORTS.

		1913-14.	1920-21.
Milk, condensed	.. .. { Tons	393	248
	£	17,064	27,565

KENYA AND UGANDA: CHIEF EXPORTS.

		1913-14.	1920-21.
Ghee	.. .. { Tons	510	81
	£	24,624	11,917

UGANDA PROTECTORATE

1. LIVESTOCK.—The numbers are estimated as follows: cattle, 739,321; sheep, 307,429; goats, 974,304; horses, 2; mules, 33; donkeys, 230. In addition to this there are said to be about 500,000 cattle and 3,000,000 sheep in the Rudolf Province, while Turkhana possesses herds of camels and numerous donkeys.

“Over the greater part of the Protectorate the dominant type of cattle belongs to the humped short-horned breeds, and those bred in the northern counties of the Teso district approximate somewhat closely to the Indian Zebu breed. In the Buganda Province the cattle are of a type intermediate between the humped cattle of the Eastern Province and the long-horned cattle of Ankola, and are evidently derived from many crossings. Sheep are all of the fat-tailed species, and vary but little throughout the Protectorate. Goats are of the usual small African type. The livestock of the Protectorate is responsible for a very large trade in hides and skins” (*East African Red Book*, 1922-23, p. 251).

There are Government Agricultural and Veterinary Departments (*cp.* p. 46, and *see below*).

2. MEAT AND DAIRY PRODUCTS.—As in the case of Kenya, local supplies have to be supplemented by imports.

[For imports and exports *see* Kenya.]

TANGANYIKA TERRITORY

1. LIVESTOCK.—It is estimated that cattle number about 3,000,000, sheep and goats about 5,000,000, pigs 1,917, and camels 20. The Government Agricultural and Veterinary Departments are concerned with combating the numerous stock diseases. There is a Biological and Agricultural Institute at Amani, and proposals have been made for converting this into a central research institute serving all the British Territories in East Africa.

2. MEAT AND DAIRY PRODUCTS.—Foods of animal nature are supplemented by imports. Ghee is among the exports.

CHIEF IMPORTS (1921).				CHIEF EXPORTS (1921).			
Butter	..	..	{ Tons 17	Livestock	..	{ Number 8,775	
			{ £ 4,274			{ £ 5,893	
Ghee	..	..	{ Tons 70	Ghee	..	{ Tons 630	
			{ £ 5,387			{ £ 31,792	
Fish, dried or salted	..		{ Tons 512				
			{ £ 8,282				

ZANZIBAR AND PEMBA

The prevalence of tick-borne and other diseases greatly interferes with stock-raising, and necessitates great activity on the part of the Government Veterinary Department. Slaughter cattle are imported from the mainland, and dairy stock from India. The number of cattle in 1914 was returned as 11,075. Sheep are

48 MEAT, FISH, AND DAIRY PRODUCE

of secondary importance; many are imported to supplement the meat supply. There are large herds of goats, and these are of particular value for milk production.

Fish is a staple native food, but only enough is caught for local consumption. In 1922 there were 4,000 fishing boats, giving employment to 8,100 fishermen.

CHIEF IMPORTS.

						1913.	1921.
Ghee	..	..	..	..	..	£31,515	£30,443
Fish, dried	..	..	..	..	..	£12,742	£11,864

NYASALAND PROTECTORATE

European settlers have been attracted to the Protectorate, for the most part by "booms" in various crops, and this has interfered with the development of the livestock industry. The numbers of the chief classes of stock in 1920 were as follows:

		<i>Asses and Mules.</i>	<i>Cattle.</i>	<i>Sheep.</i>	<i>Goats.</i>	<i>Pigs.</i>
European owned	..	280	14,000	1,700	540	850
Native owned	..	—	70,000	37,000	143,000	18,000

The cattle are of humped and Afrikander type. The use of Aberdeen-Angus and Sussex bulls for crossing Indian humped cattle has given good results. Oxen are employed for transport and agricultural work. Cattle are disposed of locally. "Fly-belts" and tick-borne diseases are serious obstacles to progress.

By crosses with merino rams the native sheep have been to some extent improved for both mutton and wool production. Pigs are only plentiful in Angoniland.

CHIEF IMPORTS.

						1913-14.	1921.
Provisions	..	..	..	..	..	£23,465	£26,931

SOMALILAND PROTECTORATE

The native population are mostly in the pastoral stage of civilization. Cattle, sheep, and ghee are exported.

CHIEF EXPORTS (DOMESTIC PRODUCE).

						1913-14.	1921.
Sheep and goats	..	..	{	Number		86,621	84,861
				£		28,874	65,459
Ghee	..	..	{	Tons		396	222
				£		27,444	21,593

MAURITIUS

1. **LIVESTOCK.**—The numbers of the chief kinds of livestock for 1914 and 1921 were as follows:

	<i>Horses.</i>	<i>Asses.</i>	<i>Mules.</i>	<i>Cattle.</i>	<i>Sheep.</i>	<i>Goats.</i>	<i>Pigs.</i>
1914	1,551	—	—	41,301	2,030	—	16,378
1921	1,456	517	429	44,339	2,512	45,862	8,104

The Board of Agriculture has a Government Stock Farm at its disposal, and is endeavouring to improve the cattle of the island by the use of Indian stud cattle and pure-bred animals of milking strain from South Africa. Madagascar is an important source of supply for horned stock. There are Veterinary Officers for dealing with animal diseases.

2. **DAIRY PRODUCTS.**—The interests of the dairy industry are being promoted by improvement of stock.

3. **POULTRY.**—There are a considerable number of poultry in the island, and the development of the industry is in charge of the Board of Agriculture.

4. **FISH.**—The fishery resources of Mauritius have not been developed.

CHIEF IMPORTS.

		1913.	1921.
Cattle	{ Number	7,680	17,842
	{ £	81,906	105,275
Fish, dried and salted ..	{ £	23,599	62,399

AMERICA

CANADA

1. **LIVESTOCK.**—The numbers and value for 1911 and 1921 were as follows:

		1911.		1921.
Horses	2,598,958	(£97,600,623)	..	3,813,921 (£80,439,689)
Milch cows	2,595,255	(£28,002,634)	..	3,736,832 (£48,595,677)
Other cattle	3,930,828	(£22,048,947)	..	6,469,373 (£46,932,522)
Sheep	2,174,300	(£2,734,876)	..	3,675,860 (£5,955,933)
Swine	3,634,778	(£6,896,581)	..	3,904,895 (£14,015,177)

All branches of pastoral industry, as, indeed, all branches of agriculture, are organized with great thoroughness by the Department of Agriculture of the Dominion and its several Provinces. There are also numerous Livestock Associations, Farmers' Clubs and Institutes, and Agricultural Societies. Instruction and research are amply provided for by Agricultural Colleges and

a number of Experimental Farms and Stations. The importance of the business side, as well as of production, is fully realized, and co-operative methods are largely employed.

Apart from a special type of French-Canadian cattle in Quebec, the breeds of livestock are much the same as in the United Kingdom, some of those most in favour being—*Cattle*: Shorthorns, Ayrshires, Friesians, Jerseys; *sheep*: Shropshires, Southdowns, Leicesters, Oxford Downs, Horned Dorsets; *pigs*: Yorkshires, Berkshires, Tamworths.

2. MEAT.—Canadian exports include not only living animals for slaughter, but also fresh or preserved meats of various kinds, as will be gathered from the subjoined figures. Bacon and ham are of marked importance.

3. DAIRY PRODUCTS.—The dairying industry is one of great importance, and being organized on the factory system uniformity of products is secured, so that the demand is steady. The surplus of dairy commodities available for export has rapidly increased of late years. While there has been some decline in the output of cheese, this has been more than compensated for by increased butter production.

4. POULTRY AND EGGS.—Great attention is paid to the poultry industry, which shows continuous expansion. This is largely due to the comprehensive nature of the work carried out by the Poultry Division of the Experimental Farm Scheme. The following main lines are now covered: artificial and natural incubation, systems of breeding and rearing, production of heavy-laying strains, feeding for eggs and table, housing. Poultry survey work, where groups of farmers are encouraged to keep accurate records, has been followed by satisfactory results. Poultry (and game), dressed or undressed, are exported to the U.S.A. in larger quantities than to the United Kingdom, but the contrary is true for eggs.

5. HONEY.—There is a Bee Division of the Dominion Experimental Farms Scheme, but imports of honey are at present largely in excess of exports.

6. FISH.—The Dominion Minister of Marine is also in charge of Fisheries, and further provision for official administration is made by such of the Provinces as are directly concerned. There are Fishery Research Stations at St. Andrews, N.B., and Nanaimo, B.C., under direction of the Biological Board of Canada. Fish culture is also actively conducted. "Government assistance to the fishing industry takes various forms. For many years the Government has conducted fish hatcheries with a view to restocking the waters which have been overfished. In 1920 there were in operation 35 main hatcheries, 11 subsidiary hatcheries, and 6 salmon-retaining ponds, from which the total distribution during the year amounted to no less than 750,386,790 eggs, fry, and older fish, including 418,290,750 whitefish distributed mainly in Ontario and Manitoba, but also in British Columbia, and 145,753,600 pickerel, distributed in Ontario and Manitoba. Sockeye salmon to the number of 90,175,369 were distributed in British Columbia. In the season of 1921 the total distribution had increased to 845,856,651 individuals, mainly fry, including 534,895,800 white fish, 165,625,000 pickerel, and 84,789,624 sockeye salmon. The expenditure for this service in 1920-21 was \$364,789" (*Canada Year Book*, 1921, pp. 325-6).

Canada adjoins two of the finest sea-fishing areas of the world, the North Atlantic and North Pacific, while the area of her lakes and rivers is about half the world total. In accordance with this there are Atlantic, Pacific, and Inland Fisheries.

(1) *Atlantic Fisheries*.—The coast-line, neglecting the smaller bays, is over 5,000 miles in length, and Hudson Bay, with a coast of 6,000 miles, constitutes a great reserve. Cod and haddock are of most importance, and after these come halibut, herring, sardines (young herring), and mackerel. *Oysters* were formerly extremely plentiful, but the numbers are now much reduced. *Lobsters* are only next to cod in value, owing to the rise of the canning industry, but unfortunately the supply is considerably depleted, mainly because it is found difficult to enforce the restrictions as to the capture of undersized or spawning individuals.

(2) *Pacific Fisheries*.—Here the coast-line is more than 7,000 miles in length, and it is well adapted for fishing purposes, being extremely well sheltered owing to the existence of innumerable islands. *Salmon* are here of most importance, as they furnish the material for the extensive canning industry. There are five varieties of this fish—which is not the “true” salmon familiar in Britain—the most important being the “sockeye,” and after this the spring or “quinnat” salmon. Halibut comes next to salmon, while herring, sturgeon, cod, and anchovy are of less importance.

(3) *Inland Fisheries*.—Salmon is valued mainly as a sporting fish, while whitefish is most important commercially. It is indigenous to the Great Lakes, as well as to Lake Winnipeg, and the weight of the total catch in 1920 was 6,978,600 pounds. Extensive but undeveloped inland fisheries, with abundant whitefish, dore, and lake trout, are to be found to the north and west of the last-named lake.

CANADIAN FACTORIES CONCERNED WITH ANIMAL FOODS, 1919.

				Number.	Cost of Materials (Thousand £).	Value of Products (Thousand £).
Slaughtering and meat-packing	..	..	..	82	44,756.4	59,783.8
Sausages .. .. .	..	..	..	13	63.2	98.1
Beef extracts .. .. .	..	..	..	4	72.2	169.3
Preserved foods .. .. .	..	..	..	31	882.9	1,274.7
Butter and cheese .. .. .	..	..	..	3,258	25,993.1	30,486.4
Condensed milk .. .. .	..	..	..	24	3,189.8	4,058.2
Prepared fish .. .. .	..	..	..	928	4,939.8	8,221.9

CHIEF CANADIAN IMPORTS.

				1913-14.	1921-22.
Pork .. .. .	..	..	{ Tons	5,403	16,975
			{ £	253,945	1,114,605
Other meat .. .. .	..	..	{ Tons	896,861	735,932
			{ £	3,405	2,714
Butter .. .. .	..	..	{ Tons	391,065	387,064
			{ £	11,855,465	9,637,303
Eggs .. .. .	..	..	{ Dozens	559,294	665,893
			{ £	477,924	598,865
Fish .. .. .	..	..	{ £

CHIEF CANADIAN EXPORTS (DOMESTIC PRODUCE).

				1913-14.	1921-22.
Horses	{	Number	£	3,568	2,251
				161,080	110,060
Cattle	{	Number	£	219,729	213,484
				1,625,285	1,755,044
Beef, all kinds	{	Tons	£	5,863	12,688
				231,848	684,441
Pork	{	Tons	£	808	1,306
				41,603	93,262
Bacon and hams	{	Tons	£	11,495	44,289
				829,027	4,730,343
Milk and cream, fresh	{	Gallons	£	1,631,117	3,062,977
				274,895	573,706
Milk, preserved	{	Tons	£	4,169	15,198
				137,093	1,045,273
Butter	{	Tons	£	548	3,764
				63,626	662,791
Cheese	{	Tons	£	64,499	59,754
				3,878,584	5,229,400
Eggs	{	Dozens	£	124,002	4,399,534
				7,636	419,200
Fish, fresh and frozen	{	Tons	£	766,231	1,883,458
				33,325	34,824
Fish, dry salted	{	Tons	£	938,306	1,256,603
				27,276	34,471
Salmon, canned	{	Tons	£	1,363,120	1,322,391
				350,988	346,493
Salmon, pickled	{	Tons	£	3,693	3,234
				613,375	436,239

NEWFOUNDLAND

1. LIVESTOCK.—The numbers of the chief kinds of stock for 1911 and 1921 were as follows:

			Horses.	Cattle.	Sheep.	Goats.	Pigs.
1911	..	..	13,288	31,998	75,439	—	19,321
1921	..	..	16,145	27,789	86,145	14,379	14,110

During the last twenty years there has been a general decline in agricultural production, but the Department of Agriculture is making vigorous efforts to extend and improve the industry, and the establishment of Demonstration Farms has recently been recommended by the Director of Agriculture. The improvement of livestock is being effected by means of pedigree animals, and the Government possesses a number of pedigree stallions, bulls (mostly Holstein-Holstein-Friesian, and Ayrshire), rams, and boars which are being used for this purpose. Some of these are kept at the Government Stock Farm and Stables, while others are assigned to certain districts.

Cattle.—The breeds mentioned above are particularly favoured, and besides these there are a good many Aberdeen-Angus, Shorthorn, and Jersey stock.

Sheep.—A good many breeds are represented, but Shropshire and Dorset Horn rams are employed more particularly for improvement purposes.

Pigs.—Yorkshires, Berkshires, and Tamworths are most in favour.

2. MEAT.—In 1921 the numbers of animals slaughtered for food were: cattle, 7,690; sheep, 27,463; pigs, 9,658. It is necessary, however, to supplement the local supply by large imports of meat in a great variety of forms, mostly from Canada, the U.S.A., and the United Kingdom.

3. DAIRY PRODUCTS.—The dairying industry is undergoing development, and ensilage for milk cows is being used to an increasing extent. The yield of milk in 1921 was 3,109,896 gallons, and 588,841 pounds of butter were produced. Dairy products and butterine are imported on a considerable scale, a large proportion being of Empire origin.

4. POULTRY AND EGGS.—Considerable attention is being paid to extension and improvement of the poultry industry, the interests of which are promoted by the Newfoundland Poultry Association and other similar Associations of more local character. The high cost of poultry food is the most serious bar to progress. The chief breeds are Rhode Island Reds, Leghorns, Plymouth Rocks, Buff Orpingtons, and Wyandottes. There were 231,122 head of stock in 1921. The eggs produced in that year amounted to 817,275 dozens. A considerable amount of dead poultry (and game) is imported, and a large number of eggs, Canada being the chief source of supply in each case.

5. FISH.—Fisheries, including those of Labrador, are the chief industry of the Dominion, and the export trade is very large. The average value of exports in fishery products for the five years ending 1913 was about £2,000,000, amounting to over £8 per head of the population. The total value of all fishery products for 1913 was £569,419, and for 1922 £802,707. The figures include those for the seal and whale fisheries, in which we are not here interested.

Three fishery branches are concerned with the capture of *cod*, which is by far the most important food-fish, accounting for about 80 per cent. of the total output. They are: (1) The *Shore Fishery*, carried on from June 1 to October 30, and yielding about two-thirds of the total catch. (2) The *Labrador Fishery* during June to September, inclusive, and engaged in the trapping and curing of fish. (3) The *Grand Bank Fishery*, from April to the autumn. To some extent the catch (wet salted) is sold in the U.S.A. markets, but the bulk is taken to Newfoundland for curing or canning.

The particulars just given apply to the main fishing season, but there is also a good deal of cod-fishing during winter and spring off the south and west coasts, in the Gulf of St. Lawrence, and in the Straits of Belle Isle.

Oil production is an important adjunct to the cod fishery. The crude form, *cod oil*, is used for various industrial purposes, while the name *cod-liver oil* is applied to the refined product, which is of great medicinal value as a food, partly because of its high vitamine content. The manufacture of cod-liver oil has been standardized, and is thoroughly up-to-date.

The *herring fishery* is carried on, chiefly on the west coast, from October to

January, and the catch is mostly taken to Canada or the U.S.A., salted in bulk, or packed after freezing by exposure to the cold air, while some are pickled in barrels. Herrings are also caught and pickled in some of the bays on the south and east coasts, and these make up about half of the exports of this kind of fish. Capture is in all cases by small nets in coastal waters, and there is no drift-net fishing for herrings in the deep sea, this method affording a field for future development.

Salmon are caught in large numbers, most of them being pickled and packed in tierces for export. Among other fish of less importance may be mentioned haddock, hake, halibut, turbot, smelt, and trout.

In order to increase the trade in "fresh" fish the methods of refrigeration have recently been adopted, and further advances in this direction may be anticipated. "A new development of the fish industry—the preservation of fresh fish in cold storage—promises to secure a considerable share in the market of the United Kingdom for the products of the 'Ancient Colony.' A large plant is now working at St. John's which can produce a turn-out of 200,000 pounds per day. . . . Several thousand tons of Newfoundland fish preserved by the cold storage plant were brought to the United Kingdom by the Ministry of Food during the War, and had the War continued Newfoundland would have played a still more important part in preserving the food security of the Empire. The isolation of the island, and the difficulty of obtaining transport with refrigerated space, has hitherto been a bar to the free exploitation of this most promising industry, but with the new facilities for preservation, and better transport, the vast markets of Canada and the United States, besides those of the United Kingdom, from which Newfoundland is only seven days' journey, should provide a large and increasing trade" (*Dominion of Newfoundland and Labrador*, 1921, p. 34).

Preserved Fish.—The bulk of the export trade, however, is in fish which have been dried, smoked, pickled, or canned. Cod, in the canned state, has been shipped to such distant countries as South Africa and Australia, and is a particularly satisfactory product, but unfortunately it is more expensive than canned salmon, the price of which is regarded as the maximum for canned fish by consumers, so that its future depends on the possibility of reducing cost of production by means of labour-saving machinery. One problem awaiting solution is that presented by the capelin (*Mallotus villosus*), a small fish resembling the smelt, and of delicate flavour, which visits the coast in vast numbers every June. It is employed as bait, and to some extent dried for export as food, but is chiefly used as manure.

Lobster Fishery.—The annual value of the output was at one time about £100,000 per annum, but the industry has declined owing to reckless depletion of the supply. Strict measures of protection are bringing about a revival. Most of the lobsters caught are canned. In 1913-14 the number of cases exported—each case containing forty-eight 1-pound tins—was 16,074, and in 1921-22 only 12,006.

Oysters.—It has been suggested that the establishment of oyster-beds might prove a profitable enterprise.

CHIEF NEWFOUNDLAND IMPORTS.

				1913-14.	1920-21.
Livestock	..	..	..	£ 37,586	50,860
Salt beef	..	..	..	{ Barrels £ 35,381	28,974
				£ 134,157	139,250
Salt pork	..	..	..	{ Barrels £ 38,421	23,120
				£ 169,006	151,155
Other meat	..	..	..	£ 60,148	132,885
Butter	..	..	..	{ Tons £ 273	234
				£ 32,991	57,847
Oleo and lard for butterine	..		..	£ 59,158	124,454

CHIEF NEWFOUNDLAND EXPORTS (DOMESTIC PRODUCE).

				1913-14.	1920-21.
Cod, dried	..	..	..	{ Tons £ 122,761	134,224
				£ 1,659,222	2,741,074
Cod, pickled	..	..	..	{ Tons £ 19,949	2,996
				£ 87,506	32,991
Cod oil, unrefined	..	..	..	{ Gallons £ 1,054,208	751,616
				£ 79,514	97,508
Cod oil, refined	..	..	..	{ Gallons £ 26,218	45,956
				£ 3,497	16,441
Herrings, pickled	..	..	..	{ Barrels £ 75,790	78,232
				£ 65,682	132,665
Herrings, other	..	..	..	£ 31,429	16,441
Salmon	..	..	..	£ 26,069	39,900
Lobster, canned	..	..	..	{ Cases* £ 16,074	12,450
				£ 71,521	62,685

* A case contains 48 one-pound tins.

BERMUDAS

As already indicated (Part I., p. 92), this colony has specialized in the production of fruit, vegetables, etc., mainly for export to the U.S.A.

1. LIVESTOCK.—The numbers of the chief kinds of stock for 1913 and 1921 were as follows:

				Horses.	Cattle.	Goats.	Pigs.
1913	..	..	..	1,208	1,241	700	3,000
1921	..	..	..	1,300	1,550	500	2,000

2. MEAT, DAIRY, AND POULTRY PRODUCTS.—These are produced to some extent for local consumption, and there is even a small export trade. There is, however, a large net importation of animal food products of various kinds.

CHIEF IMPORTS.

		1913.	1921.
Cattle	{ Number	1,281	24
	{ £	22,956	619
Beef	{ Tons	616	615
	{ £	20,568	48,056
Meat, salted and smoked ..	{ £	20,040	36,612
Meat (and fruit), canned ..	{ £	17,558	36,483
Fish, preserved	{ £	7,177	14,132

BRITISH WEST INDIES

Here the pastoral industries occupy a subordinate position and, taking the islands as a whole, the dependence on imported food of animal nature is much greater than in most parts of the Empire.

Although sea-fish are caught to a certain extent for local consumption, the fisheries are undeveloped, and fish products are largely imported. Many edible species abound in the Caribbean Sea, including Spanish mackerel and the allied but much larger king-fish, mullets (eight or nine species), sea-perches, barracoutas, and conger-eels. Crustacea are plentiful, and oysters are found locally.

I.—BAHAMAS.

These islands are chiefly concerned with fruit production, and the stock-raising industry has greatly declined. The numbers of the chief kinds of stock in 1913 were as follows: horses, 1,191; cattle, 1,721; sheep, 12,338; goats, 4,552. A good deal of fish is caught for local consumption.

CHIEF IMPORTS.

Meats:		1913.	1921.
Fresh (including poultry and game)	{ Tons	48	60
	{ £	4,387	7,826
Salted	{ Tons	276	157
	{ £	15,071	8,609
Preserved (including fruits)	{ £	33,987	9,467
Lard	{ Tons	246	211
	{ £	10,378	10,392
Butter	{ Tons	49	44
	{ £	4,727	11,154

II.—JAMAICA.

1. LIVESTOCK.—The numbers of the chief kinds of livestock for 1913 and 1921, so far as ascertainable, were as follows:

		Horses.	Asses.	Cattle.	Sheep.	Goats.	Pigs.
1913		52,666	—	115,577	10,278	17,250	31,000
1921		—	17,385	140,985	8,393	—	—

The Department of Agriculture is making steady progress in the improvement of livestock, and there is a Government Stud Farm for horse-breeding from pedigree sires, and crossing for production of mules. A Government Stock Farm has also been established, and this is chiefly devoted to tropical dairying. In March, 1922, it possessed 366 head of cattle valued at £9,188. These consisted of 103 pedigree animals (45 Red Polls, 33 Jerseys, 13 Brown Swiss, 6 Guernseys, and 6 Ayrshires), 32 Zebu Jerseys, 215 native dairy cows and heifers, and 16 plough steers.

Agricultural instruction is given at the West Indian Agricultural College and a Farm School. Farming interests are promoted by the Jamaica Agricultural Society.

Cattle are raised for the most part in St. Ann's parish and in the western part of the island.

2. MEAT.—There is a good supply of fresh meat for local consumption, but little export. Importation of meat products is considerable.

3. DAIRY PRODUCTS.—A good deal of attention is paid to the dairying industry, which provides to a great extent for local consumption, but there is also some importation of dairy products. The establishment of a condensed milk factory is proposed.

4. POULTRY AND EGGS.—Poultry-keeping is among the subsidiary agricultural industries, and instruction is given at the educational institutions mentioned above. There is some import of poultry products.

5. HONEY.—Bee-keeping is practised to a large extent, and the importation of queen bees is strictly regulated.

6. FISH.—The fisheries are undeveloped, and imports are considerable.

The CAYMAN ISLANDS, a dependency of Jamaica, maintain a considerable number of cattle (1,884 in 1913, and 1,300 in 1921), and help to maintain the supply of meat for that colony. There is an important turtle fishery, the annual catch being about 5,000 and sent to Jamaica for export.

CHIEF IMPORTS.

		1913.	1921.
Beef	{ Barrels	3,362	2,940
	{ £	12,860	16,655
Pork	{ Barrels	6,012	4,196
	{ £	23,082	26,959
Bacon and hams	{ Tons	114	118
	{ £	10,816	26,913
Butter	{ Tons	538	258
	{ £	44,462	52,460
Milk, condensed	{ £	61,284	132,161
	{ Tons	96	149
Cheese	{ £	8,964	20,808
	{ Tons	56,369	42,242
Fish, wet	{ Barrels	66,790	103,274
	{ £	4,526	4,918
Dried or salted	{ Tons	134,345	247,533
	{ £		

CHIEF EXPORTS (DOMESTIC PRODUCE).

		1913.	1921.
Honey	.. .. . { Tons	683	396
	£	15,261	8,653

III.—TURKS AND CAICOS ISLANDS.

Nearly all the food is imported, and the numbers of livestock are small. In 1913 there were 75 horses, 500 cattle, 50 sheep and 250 pigs. Of other kinds of stock there were in 1911: asses, 353; mules, 185; and goats, 1,025.

CHIEF IMPORTS.

		1913.	1921.
Beef and pork, salted	.. { Tons	25	19
	£	1,151	1,555
Lard .. .. .	.. { Tons	23	23
	£	894	2,137
Milk, condensed	.. .. . £	704	1,577

CHIEF EXPORTS (DOMESTIC PRODUCE).

		1913.	1920.
Dried conchs (shellfish)	.. { Number	267,550	857,850
	£	557	841

IV.—LEEWARD ISLANDS.

In the VIRGIN ISLANDS there is excellent pasture (Guinea grass), and cattle-raising is of relative importance, considering that the population is only 5,082 (in 1921) and the total area only 58 square miles. In 1921 there were 1,478 cattle, 139 sheep, 3,291 goats, and 575 pigs. Poultry-keeping is carried on to some extent, and there is a good deal of fishing.

In ST. KITTS, NEVIS, and BARBUDA there is a certain amount of stock-rearing.

V.—TRINIDAD AND TOBAGO.

1. LIVESTOCK.—The numbers of the chief kinds of livestock for 1913 and 1920 were as follows:

		Horses.	Mules.	Cattle.	Sheep.	Goats.
1913	.. .. .	5,453	4,769	12,980	2,409	6,476
1920	.. .. .	4,155	3,646	10,448	3,010	4,294

The livestock industry is somewhat neglected, although there is plenty of good grazing land. Working cattle are bred at a Government Stock Farm. The College of Tropical Agriculture now being established in Trinidad will no doubt do much for the pastoral industries in tropical America.

CHIEF IMPORTS.

		1913.	1921.
Cattle	{ Number	7,290	11,098
	{ £	48,661	133,632
Meat, all kinds	{ Tons	2,214	1,463
	{ £	93,222	106,522
Lard and lard substitutes ..	{ Tons	1,154	1,388
	{ £	47,936	92,001
Butter	{ Tons	316	382
	{ £	2,827	72,155
Milk, condensed	{ Tons	970	1,036
	{ £	44,896	114,340
Fish, all kinds	{ Tons	2,959	3,388
	{ £	82,572	140,553

VI.—WINDWARD ISLANDS.

These are better stocked than many other parts of the British West Indies. ST. VINCENT has an available surplus of livestock which is sold to Barbados and Trinidad. GRENADA produces enough fresh meat for local consumption and exports some of its surplus livestock. The number of cattle in 1911 was 5,101. There is abundance of fish, and oysters of good quality are found at Carriacou, the largest of the Grenadines. Turtles are caught and exported.

GRENADA: CHIEF IMPORTS.

		1913.	1921.
Fish, dried, salted, or smoked	{ Tons	508	450
	{ £	12,885	12,641

ST. LUCIA: CHIEF IMPORTS.

		1913.	1921.
Butter and butter substitutes	{ Tons	68	37
	{ £	4,103	5,203
Fish, dried, salted, and smoked	{ Tons	363	382
	{ £	10,152	11,277

ST. VINCENT: CHIEF IMPORTS.

		1913.	1921.
Beef and pork, salted and cured	{ Tons	54	15
	{ £	2,669	1,027
Butter	{ Tons	18	11
	{ £	2,132	2,285
Fish (not canned or preserved)	{ Tons	—	294
	{ £	6,440	7,904

MEAT, FISH, AND DAIRY PRODUCE

VII.—BARBADOS.

The improvement of livestock is receiving considerable attention. There is considerable production of most kinds of animal food, but some of these are supplemented by imports.

CHIEF IMPORTS.

		1913.	1921.
Meat, bacon, and hams ..	{ Tons	925	768
	{ £	42,673	90,476
Butter and butter substitutes	{ Tons	348	265
	{ £	25,011	53,509
Fish, dried, salted, or smoked	{ Tons	5,338	—
	{ £	54,241	147,637

BRITISH GUIANA

The stock-raising industry has not been developed, though unlimited grazing is available. There is a small export of pastoral products, but this is greatly supplemented by the imports.

The numbers of the chief kinds of stock for 1913 and 1921 were as follows:

	<i>Horses.</i>	<i>Asses.</i>	<i>Mules.</i>	<i>Cattle.</i>	<i>Sheep.</i>	<i>Goats.</i>	<i>Pigs.</i>	<i>Buffaloes.</i>
..	500	6,060	1,780	81,000	18,500	14,000	14,000	74
..	208	6,569	2,746	83,906	20,396	11,642	12,235	212

It is also estimated that there are from 30,000 to 40,000 cattle in the "hinter-

CHIEF IMPORTS.

		1913.	1921.
Beef and pork	{ Barrels	17,678	16,434
	{ £	66,896	46,608
Butter	{ Tons	221	153
	{ £	23,379	29,981
Fish, dried and smoked ..	{ Tons	2,335	2,236
	{ £	30,424	79,650

BRITISH HONDURAS

This Colony is chiefly of importance on account of its forestry resources and its extent for production of rubber, sugar, cacao, and various tropical fruits. The pastoral industry is quite subsidiary, but behind the swampy coast-belt are large tracts of grazing land. There are considerable imports of all kinds of.

The number of livestock in 1917 were returned as follows: horses and mules, 500; cattle, 3,000; sheep, goats, and pigs, 5,050.

CHIEF IMPORTS.

		1913.	1921.
Cattle	{ Number	3,988	852
	{ £	29,962	8,380
Beef and pork	{ Barrels	5,021	3,976
	{ £	21,707	21,791
Provisions	{ £	39,606	9,105
Milk, preserved	{ £	15,651	26,417
Butter and butter substitutes	{ £	7,988	11,702

FALKLAND ISLANDS

1. LIVESTOCK.—The numbers of the chief kinds of livestock for 1913 and 1921 were as follows:

		Horses.	Cattle.	Sheep.	Pigs.
1913		3,670	7,530	698,072	60
1921		3,467	7,674	667,677	24

Sheep-farming, by far the most important industry, is carried on primarily for wool production. The equable climate is well adapted to stock-rearing, and there is abundant grazing land, some of which has been artificially improved. The islands are believed capable of maintaining some two million head of sheep. Cattle occupy a secondary place, but there is some export trade in hides and tallow. Pigs are hardly represented.

2. MEAT.—Frozen and canned meat come next to wool as exports. There is a factory at Goose Green, Port Stanley, where no less than 42,000 sheep were canned in 1917. Bacon and hams are imported for local consumption.

3. DAIRY PRODUCTS AND POULTRY AND EGGS.—The chief needs of the colony are met by local production.

4. FISH.—There is an abundance of sea-fish. For the whale-fishery reference should be made to Vol. X. in this Series.

AUSTRALASIA

AUSTRALIA

1. LIVESTOCK.—The comparative numbers of the chief kinds of livestock for 1910 and 1920 may be seen from the following:

		Horses.	Cattle.	Sheep.	Pigs.
1910		2,165,866	11,744,714	92,047,015	1,025,850
1920		2,415,510	13,499,737	77,897,555	764,406

The animal population of Australia fluctuates greatly in numbers from time to time, owing to the prolonged droughts that are liable to occur, and which are particularly disastrous in the case of sheep. Both the beginning and end of the late War were marked by severe droughts, the second one extending to the winter

of 1920. (The Australian winter, of course, corresponds in point of time with the summer of the northern hemisphere.)

Australia is well suited for the breeding of all types of *horses*, including the heavy agricultural races. The Dominion is the seventh country in the world as regards number of *cattle*, and an easy first in respect of the number of *sheep*, which sufficiently indicates the great importance of the pastoral industry.

2. MEAT—*Beef*.—Beef breeds occupy a leading position in the cattle population, and the finest animals are raised in the tropical parts of the Commonwealth—North Queensland, the Northern Territory, and the Kimberley districts in the north of West Australia.

Mutton.—Sheep are also of great importance as producers of meat for export. Much attention is devoted to raising those breeds and crosses which are valuable both for wool and mutton, such as Shropshires, Southdowns, and crosses between Merino and Lincoln or Merino and Leicester.

Bacon, Ham, Pork, and Lard.—Swine occupy a more subordinate position in food production, but there is considerable export of bacon, ham, frozen pork, and lard.

3. DAIRY PRODUCTS.—The temperate parts of Australia are well suited to the dairy industry, and the proportion of dairy cattle to all cattle is high in New South Wales, Victoria, South Australia, and Tasmania. Much attention has been paid to the improvement of stock, and the industry is officially supervised. Uniformity in quality and economy in manufacture have been promoted by the establishment of creameries, butter factories, and cheese factories. In 1920-21 there were 579 factories manufacturing butter, cheese, or condensed milk.

Australian grass-fed butter competes in the winter markets of the United Kingdom and other countries of the northern hemisphere with local butter produced under more unfavourable conditions. The production and export of both butter and chesese have steadily increased of recent years, and the preparation of condensed, concentrated, or powdered milk is a young but promising offshoot of the dairy industry.

4. POULTRY AND EGGS.—As in so many countries poultry-keeping is a common accessory of ordinary farming or of dairying, but the development of poultry-farming as a distinct industry, or in association with pig-farming, has arisen of late years. Much improvement has been effected in both egg-laying and table strains, and special poultry farms have been established to promote these ends. In some districts co-operative egg-collecting circles have been formed, while in other cases eggs are marketed by the agency of local butter factories.

The total value of poultry and eggs for the entire Commonwealth has been estimated at £9,846,104 for the year 1920-21.

Australia has a small export trade in live and frozen poultry, eggs, and egg contents.

5. RABBITS.—It is a matter of common knowledge that rabbits and hares are not indigenous to Australia, but that when introduced they multiplied to such an enormous extent as to become a serious agricultural pest. Now, however, they are turned to commercial account, their skins and frozen carcasses are exported on a considerable scale.

6. HONEY.—Bee-keeping is for the most part an accessory industry, but the honey exported is usually in excess of that imported. Australian honey is of high quality, and the industry would appear to be susceptible of considerable development.

7. FISH.—Australian fisheries have not, so far, been developed to any considerable extent, though many valuable food-fishes abound in the coastal waters. The annual consumption per head of the population is only 10 pounds, as compared with 42 pounds for Great Britain. Transport and marketing present greater difficulties than in a more closely settled country. A considerable quantity of preserved fish, mostly tinned, is imported.

Natural *oyster-beds* exist in certain localities, especially on the coasts of New South Wales and Queensland, and in some cases the output has been much increased. It is believed that there is a great future for this industry.

Some attention has been paid to stocking the inland waters, and fresh-water fishes have a certain importance in some localities as a source of food.

The Commonwealth exports a very small quantity of fresh and a fair amount of *preserved fish*, but these are far exceeded in amount and value by the imports.

Queensland and the Northern Territory both possess *bêche-de-mer* fisheries in connection with the pearling industry. The value of the cured product exported to Hong-Kong for Chinese consumption in 1920 was £70,898.

AUSTRALIAN FACTORIES CONCERNED WITH ANIMAL FOODS, 1920-21.

	Number.	Cost of Materials (Thousand £).	Value of Products (Thousand £).
Meat and fish preserving	280	10,297·2	12,526·9
Bacon-curing	66	3,187·2	4,175·5
Butter, cheese, and condensed milk ..	579	22,096·8	25,400·3

CHIEF AUSTRALIAN IMPORTS.

		1913.	1921.
Milk and cream, preserved ..	{ Tons	514	269
	{ £	26,579	30,883
Butter and butter substitutes	{ Tons	1,523	18
	{ £	1,572	3,357
Fish, canned	{ Tons	8,587	5,175
	{ £	525,996	649,610

CHIEF AUSTRALIAN EXPORTS (DOMESTIC PRODUCE).

		1913.	1921.
Cold process meats:	{ Tons	25,023	80,197
	{ £	575,732	3,819,841
Beef	{ Tons	48,762	24,506
	{ £	1,377,502	1,578,658
Mutton and lamb	{ Tons	497,568	432,745
	{ £	23,270	3,556
Rabbits and hares	{ Tons	1,083,639	374,688
	{ £	1,462	16,643
Canned meats	{ Tons	72,950	2,184,761
	{ £	33,837	41,259
Milk, preserved	{ Tons	3,564,925	11,067,104
	{ £		
Butter	{ Tons		
	{ £		

PAPUA

This Australian Territory is of little importance as regards the pastoral industry, but small numbers of livestock have been introduced. The only fishery product exported on any scale is *bêche-de-mer* (72 tons, value £7,922 in 1920-21).

NEW ZEALAND

On inspecting a table giving the money value of New Zealand exports for a series of years we shall find the first place occupied by pastoral products, and these account for an increasing percentage of the total as time goes on. This is illustrated by the following figures, which state the values of pastoral exports for certain years and the percentages corresponding of the total values of all exports: 1902, £8,804,868 (64.5 per cent.); 1903, £10,074,963 (67.1 per cent.); 1904, £10,079,408 (68.3 per cent.); 1905, £10,921,521 (69.8 per cent.); 1906, £13,150,780 (72.6); 1907, £15,245,704 (76.0 per cent.); 1908, £11,956,066 (73.3 per cent.); 1909, £14,035,265 (74.4 per cent.); 1910, £17,520,715 (79.0 per cent.); 1911, £14,750,558 (77.5 per cent.); 1912, £16,931,480 (77.8); 1913, £18,519,145 (80.6 per cent.); War years omitted; 1919, £48,611,240 (91.2 per cent.); 1920, £41,560,176 (91.1 per cent.); 1921, £40,683,525 (93.3 per cent.).

The four main products included in this total are wool, frozen meat, butter, and cheese, with the first of which we are not here concerned, nor with the hides, skins, and tallow that also figure on the list. This, however, embraces live animals, salted and preserved meat, bacon and ham, and preserved milk.

We may say, then, that New Zealand's chief business lies in the direction indicated, and that she is becoming highly specialized in the production of food of animal origin, and of raw materials for the textile and leather industries.

1. LIVESTOCK.—The numbers of various kinds of livestock as on January 31, for 1921 and 1922, were as follows (sheep total for April 30): horses, 337,259, 332,105; asses and mules, 245, 266; dairy cows, 1,004,666, 1,137,055; cattle (total), 3,139,223, 3,323,223; sheep shorn during season, 21,923,009, 21,100,550; lambs tailed during season, 9,614,548, 10,267,550; sheep and lambs (total, April 30), 23,285,031, 22,222,259; pigs, 349,892, 384,333; Angora goats, 5,533, 5,904; other goats, 11,834, 11,576.

2. MEAT—*Beef*.—Most of the British chief breeds of cattle are represented in the Dominion, but the advance of dairying during recent years has checked the development of beef breeds, though there are still fine herds of Shorthorns, Herefords, and Aberdeen-Angus, all three with their own herd-books. The following table gives the consumption of beef and export of frozen beef for 1913, 1921, and 1922:

CATTLE SLAUGHTERED FOR FOOD.

Year ended March 31.	Number.	Approximate Weight. (Tons).	Frozen Beef Exported. (Tons).
1913	259,935	92,834	13,044
1921	366,565	130,921	40,516
1922	261,718	93,474	41,980

To these figures must be added 5,998 bullocks and cows and 4,058 calves slaughtered by farmers for local consumption during the twelve months ended January 31, 1922.

Mutton and Lamb.—Sheep are of greater importance than cattle as regards food production, and frozen mutton and lamb are exported on a large scale. The Dominion is particularly well adapted for sheep-breeding, and Lincolns, Leicesters, Border Leicesters, Southdowns (for fat lamb production), and Romneys are favoured. The reputation of the well-known "Canterbury" mutton and lamb was built upon the merits of a cross between Leicesters and Merino ewes. Consumption and export figures for 1913, 1921, and 1922 are as follows:

ANIMALS SLAUGHTERED FOR FOOD.

Year ended March 31.			Number.	Approximate Weight. (Tons).	Frozen Meat Exported. (Tons).
1913:	Sheep	.. ..	3,306,588	88,569	54,635
	Lambs	.. ..	3,505,986	56,346	45,057
1921:	Sheep	.. ..	4,615,520	123,615	137,025
	Lambs	.. ..	3,563,970	58,073	67,110
1922:	Sheep	.. ..	4,127,226	110,536	86,851
	Lambs	.. ..	5,085,269	82,984	74,572

Bacon, Ham, and Lard.—The number 349,892 already given for the pig population in 1921 was made up of 9,375 boars for stud, 50,229 breeding sows, and 290,288 other pigs. The breeding stock included: pure Berkshires, 4,952 boars and 17,634 sows; pure Yorkshires, 553 boars and 2,096 sows; other pure-breeds, 294 boars and 1,373 sows; cross-breds, 3,576 boars and 29,126 sows. The total numbers for 1922—384,333—constituted a record for the Dominion.

The numbers of swine slaughtered, and the weights of pork, bacon, and hams produced for 1913, 1921, and 1922, were as follows: 1913, 192,407 (11,166 tons); 1921, 169,700 (9,843 tons); 1922, 230,446 (13,372 tons).

3. DAIRY PRODUCTS.—The dairy cattle are for the most part pure-bred Jerseys, Friesians, Ayrshires, and Dairy Shorthorns, or cross-breds in which these races predominate. That much New Zealand milk should be rich and well suited for dairy purposes is not surprising. It must also be remembered that New Zealand grass-fed butter, like that from Australia, competes in the winter market of the United Kingdom and other countries of the northern hemisphere with local butter made under less favourable conditions.

4. POULTRY AND EGGS.—Poultry-keeping is usually carried on as a side line, but there are a few cases of poultry-farming conducted as a distinct branch. In 1911 and 1921 the numbers of birds were as follows:

			Fowls.	Ducks.	Geese.	Turkeys.	Total.
1911	..	..	3,215,031	329,230	45,389	97,933	3,687,583
1921	..	..	3,491,567	379,988	24,234	73,220	3,991,009

The average number of fowls per flock (1921) was only two dozen. For 1921, 145,993 households (61,459 in boroughs) were returned as keeping some kind of poultry.

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5. RABBITS.—These are chiefly valued for their skins, of which large numbers are exported.

6. HONEY.—Bee-farming is a steadily increasing industry, as indicated by the following figures:

	<i>Number of Households keeping Bees.</i>	<i>Number of Hives.</i>	<i>Honey Produced (Tons).</i>
1911	11,011	71,605	650.6
1921	8,426	85,861	1,253.3

It is compulsory to grade honey for export, and 384.7 tons (£28,428) were exported in 1921.

7. FISH.—The New Zealand fisheries at present occupy a subordinate position, but the possibilities of development are very considerable. The coast is well adapted to the fishing industry, and many species of edible marine fishes abound. There are also extensive *oyster-beds*. There are no indigenous fresh-water fish of any commercial value, but successful attempts have been made to introduce various races of salmon and trout.

The catch of sea-fish (including crayfish, but not including oysters) for the year ending March 31, 1922, was estimated at 13,156 tons (£362,397), while the produce of the oyster-fisheries was valued at £23,104.

During 1921 fish to the value of £34,377 and oysters to the value of £565 were exported; but, on the other hand, fish was imported during that year to the value of £62,656.

NEW ZEALAND FACTORIES CONCERNED WITH ANIMAL FOOD (1921).

	<i>Number.</i>	<i>Cost of Materials (Thousand £).</i>	<i>Value of Products. (Thousand £).</i>
Meat freezing and preserving	51	11,443.2	13,669.1
Ham and bacon curing	34	513.3	599.1
Butter, cheese, and condensed milk manufacture	423	16,400.9	19,002.0
Fish curing and preserving	8	80.4	123.6

CHIEF NEW ZEALAND IMPORTS.

	1913.	1921.
Fish, potted or preserved	£85,153	£56,032

CHIEF NEW ZEALAND EXPORTS (DOMESTIC PRODUCE).

		1913.	1921.
Meat, frozen or chilled ..	Tons	128,935	216,138
	£	4,449,933	11,164,349
Meat, potted or preserved ..	Tons	1,828	2,960
	£	101,398	273,591
Milk, preserved (condensed, milk powder, etc.) ..	Tons	8	8,302
	£	359	1,109,331
Butter	Tons	18,613	44,924
	£	2,061,651	11,169,530
Cheese	Tons	30,583	68,439
	£	1,770,297	8,199,183

FIJI

1. **LIVESTOCK.**—Although the Fiji Islands are chiefly concerned with producing food and raw materials of vegetable nature, the equable and healthy climate is well suited to pastoral industries and the animal population is considerable. In 1920 there were 9,812 horses, asses, and mules; 57,931 cattle; 1,246 sheep; 14,531 goats; and a considerable number of pigs.

Horses.—These are of all classes, including heavy breeds, among which Clydesdales predominate.

Cattle.—The chief European breeds are represented, including Jersey, Aberdeen-Angus, and Friesian. There are also Indian humped cattle.

Pigs.—The native bush pigs are descendants of the animals liberated by Captain Cook, and there are also imported pigs of various breeds. Crosses between the latter and the bush pigs thrive particularly well.

A distinction is drawn between the "dry" area and the "wet" area, which differ in regard to their suitability for stock. In the dry area no rain falls for five months of the year, and though there is always a certain amount of keep this becomes scarce. Sheep are less affected than cattle, but as these consist of cows kept for domestic purposes hand-feeding can be resorted to, so that the supply of milk is maintained at a reasonable level. All the best land in the dry area is under sugar cane, so that it is not possible to increase the head of stock to any extent.

In the wet area there is good grazing all the year round, and most of the stock are therefore to be found here. The cattle include breeding and dairy herds, and there are paddocks for fattening stock. The coconut planters keep stock as a side line.

2. **MEAT.**—A considerable amount of fresh meat is available for local consumption, but this is supplemented by imports of meat in various forms. In particular such imports include large numbers of pigs for slaughter, together with a large amount of bacon and ham. There is room for considerable extension of the swine industry.

3. **DAIRY PRODUCTS.**—Milk and butter are largely produced for local consumption, but dairy products are also imported.

4. **POULTRY AND EGGS.**—The poultry industry is but little developed, the deficiency being made up by import.

5. **FISH.**—Edible marine species abound and are caught for local consumption, and fish, preserved in various ways, is also imported.

The natives use a marine worm, the Palolo worm (*Palolo viridis*), as food, and the following account is given by W. Blaxland Benham (*Cambridge Natural History*, vol. ii. 1901, p. 297): "The worm . . . lives in fissures among corals on the reefs, at a depth of about two fathoms. At certain days in October and November they leave the reefs and swim to the shores . . . probably to spawn; and this occurs on two days in each of the above months—the day on which the moon is in her last quarter, and the day before. The natives, who call the worm 'Mbalolo,' give the name 'Mbalolo laili' (little) to October, and 'Mbalolo

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levu ' (large) to November, thereby indicating the relative abundance of the worms in these two months. The natives eat them either alive or baked, tied up in leaves; and they are esteemed so great a delicacy that presents of them are sent by the chiefs who live on shore to those living inland."

There is a *bêche-de-mer* fishery of which the products are exported.

CHIEF IMPORTS.					1913.	1921.
Meats .. .. .	..	..	..	£	22,838	23,841
Butter and ghee .. ..	..	..	{ Tons	£	195	95
				£	20,310	17,560
Fish .. .. .	..	..	{ Tons	£	352	327
				£	11,871	19,224

PACIFIC ISLANDS

Imports of animal food-stuffs are necessary, so far as the European population is concerned.

GILBERT AND ELLICE ISLANDS.

In 1919-20 the value of imported provisions (various foods) was £52,906.

TONGA PROTECTORATE: CHIEF IMPORTS.

						1913.	1921.
Meats .. .. .	..	..	..	..	..	£9,864	£34,743
Bacon, hams, and cheese .. ..	..	..	..	..	..	£567	£700
Butter .. .. .	..	..	..	..	..	£1,166	£2,384
Fish, dried, preserved, and salted ..	..	..	..	..	..	£1,937	£3,716

SECTION III

GENERAL PROBLEMS

WE have here to consider with regard to Food of Animal Origin the problem of how to increase the Empire production so as to diminish dependence on foreign countries, and stimulate inter-Empire trade. The same question has already been considered in Part I. in connection with Food of Vegetable Origin. It will be convenient, as before, to deal in succession with the United Kingdom, Dominions with a mainly European population, and those parts of the Empire where the native (non-European) population largely predominates.

It is quite impossible to put crops and stock into two watertight compartments, for agriculture in the narrow sense and the pastoral industry are inter-dependent. Sown crops are in part used as stock-food, and even when devoted to other purposes there are often residues, such as wheat offals and oilcakes that are of great value for this purpose. As crops have been reviewed in Part I., it is only necessary to remark that improvements in field husbandry help materially in the advance of animal husbandry.

IMPROVEMENT OF LIVESTOCK.—It is now universally recognized that by the adoption of modern methods of breeding domesticated animals of any given kind can be specialized for definite practical purposes. Cattle can be bred either for beef or milk production, poultry for table use or egg production, and so forth. But in spite of the fact that all this is a matter of common knowledge, a very great deal has to be done by way of improving the livestock of all parts of the Empire. Improvement schemes of the kind are essentially the concern of the State, as indeed are many matters relating to the pastoral industry and agriculture.

Dairying affords a very striking example of the advantages attending the keeping of cows which have been "improved" in the direction of milk production (quantity and quality), as against unimproved types which cost just as much to feed and yet fall short when subjected to practical tests. When the meaning of milk-recording is understood it is astonishing to find how unpopular it sometimes is, in spite of the fact that it provides an easy method of detecting "wasters." Similarly, trap-nesting has done a great deal for the poultry industry.

COMBATING DISEASE.—Unceasing research is necessary in this direction, for we have still much to learn even as regards diseases that cause much loss in the United Kingdom. The recent serious outbreaks of foot-and-mouth and the wholesale slaughter by which they were attended afford a good example of our ignorance. Tick-borne and fly-borne stock diseases have proved a serious obstacle to stock-farming in some of the hotter parts of the Empire, such as tropical Africa, but here great advances have been already made. This direction of research is also of great importance in regard to similar diseases by which human beings are affected—*e.g.*, sleeping sickness.

FEEDING OF LIVESTOCK.—Researches on animal nutrition are beginning to throw light on many matters connected with the food and feeding of stock, and the applications of this kind of knowledge to practice are likely to do much for many branches of the livestock industry. Professor T. B. Wood, in an address on "Animal Nutrition Research" given to the Farmers' Club on November 5, 1923, after describing the important research work in progress at Cambridge, Aberdeen, and Reading, said: "We are behind several other countries in feeding our commercial livestock. The facts are available, and they are being rapidly increased." Dr. Charles Crowther, in commenting on this address, spoke of the results obtained by use of the scientifically calculated rations for dairy cows recommended by Mr. Mackintosh of Reading, which "... have produced a very great improvement in those counties in which he has been acting. In a great many cases the saving of money through the use of these rations, computed on modern lines, has been very great indeed, amounting in some cases to as much as 3d. per gallon of milk produced. . . . I think the direction in which the newer feeding research is going to have the greatest influence on farm practice is that of economy. I do not think it is going to enable us to give new systems of feeding, but it is going to enable us to assess far more closely than we have been able to do in the past what is the most economical feeding that farmers can adopt under certain conditions, and in what direction they can vary it in order to secure a similar economy under different conditions. I think Professor Wood will probably agree with me that, when one goes through farms in the country, that is the direction in which we almost invariably find it possible, even on the best farms, to make some helpful suggestion. As a rule, we cannot suggest anything fundamentally wrong with the methods, but we can generally find something which we can suggest in the way of economy in the details of working those methods."

Breeding and feeding problems are often closely associated. Take, for instance, bacon and ham production. Here much depends on the type of pig, and when that is settled the question of feeding has to be considered.

UNITED KINGDOM

The United Kingdom has played a very leading part in the improvement of all classes of stock. As Mr. Alfred Mansell has recently said (December 10, 1923), in an address given to the Farmers' Club on "The Influence of Pedigree Stock on Ordinary Farm Animals": "... It is an accepted axiom that the livestock improvement of the whole world during the last hundred years has been almost entirely due to the influence of British pure-bred stock on the native breeds of the respective countries. . . . The result achieved during the last half-century in Great Britain and Ireland, and even more so in the new countries of the world, by the extensive use of pedigree stock in horses, cattle, sheep, and swine is eloquent testimony to the great improvement to be effected in livestock by the judicious use of pedigree stock." Similar results have been obtained by the same methods in poultry-breeding, and even in the minor branch of apiculture much has been done in the production of improved races of bees.

The value of pedigree stock exported from the United Kingdom to all parts of the world is very considerable, and the profits accruing have done much towards maintaining the pastoral industries in a satisfactory position as compared with arable farming. This important branch of exportation is promoted by the well-known fact that these islands are free from animal diseases to an extent unknown in the Continental countries of Europe, and this is one reason for the vigorous policy pursued by our Ministry of Agriculture in combating the recent serious outbreaks of foot-and-mouth disease. The active prosecution of veterinary research with regard to this and other diseases of the same obscure type, especially swine fever, is obviously of increasing importance. Other parts of the Empire adopt the same attitude as the United Kingdom towards stock improvement and animal diseases, and among foreign countries this is particularly true for the United States, where the prominence given to research of every kind for the advancement of the agricultural and pastoral industries is noteworthy.

The Dominions Royal Commission in their *Final Report* (1918) point out that meat is one of the commodities produced by the British Empire to an extent approximately equal to Empire requirements, but they advocate the extension of the pastoral industries in the United Kingdom and in some of the Dominions, more particularly Canada. The export of pedigree stock from the United Kingdom to the Dominions should also be encouraged, and it may be noted that Argentina, our most serious rival in meat production, is at the same time our best customer for pedigree cattle and sheep.

Increased production of *meat, dairy produce*, and other kinds of animal food in the United Kingdom, is not so urgently necessary in the interests of National Defence as it is for wheat and other cereals (Part I., p. 34). More than half our meat is home-grown, and a large part of that imported is of Empire origin. It is, however, unsatisfactory that much less than half of our cheese and butter is home produce, though the fact that a great deal of the imported dairy commodities, cheese more particularly, comes from other parts of the Empire is cheering. Our foreign bills for butter and eggs are very large. Should the Irish Free State develop the pastoral industries for which she is so eminently adapted, a great deal of her produce (particularly bacon, ham, butter, and eggs) might well replace much of that at present purchased from other nations. The following tables illustrate the points raised. They are taken from *National Food Journal*, ii., 1919, p. 435.

UNITED KINGDOM: CHIEF ANIMAL FOOD-STUFFS, HOME AND IMPORTED, 1909-13 (AVERAGE).

Commodity.	1909-13 (Average).		
	Total Supply (Tons).	Per Cent. Home.	Per Cent. Imported
Total meat (exclusive bacon and hams)	2,111,000	64.3	35.7
Bacon and hams	399,000	31.3	68.7
Butter	334,000	37.7	62.3
Cheese	158,000	25.3	74.7
Margarine.. .. .	118,000	50.8	49.2

UNITED KINGDOM: CHIEF IMPORTED ANIMAL FOOD-STUFFS (SOURCES), 1913.

					<i>Meat (Exclusive Bacon and Hams).</i>	<i>Bacon and Hams.</i>	<i>Dairy Produce.</i>
					1913. (Per Cent.)	1913. (Per Cent.)	1913. (Per Cent.)
Europe	..	..	..	..	6.2	49.0	74.6
U.S.A.	..	..	..	..	1.6	44.9	0.2
Canada	..	..	..	..	0.1	5.8	10.4
South America	..	..	..	..	54.9	—	0.6
Australasia	..	..	..	..	36.5	—	11.3
Other Countries	..	..	..	..	0.7	0.3	2.9

UNITED KINGDOM: CHIEF ANIMAL FOOD-STUFFS (HOME PRODUCTION, EMPIRE IMPORTS, AND FOREIGN IMPORTS), 1913.

					1913.		
					<i>U.K.</i> (Per Cent.)	<i>Empire.</i> (Per Cent.)	<i>Foreign.</i> (Per Cent.)
Total meat (exclusive bacon and hams)	..	..	..	..	64	13	23
Bacon and hams	..	..	..	..	31	4	65
Lard	..	..	..	..	21	3	76
Milk, fresh	..	..	..	..	100	—	—
Milk, condensed	..	..	..	..	46	—	54
Butter	..	..	..	..	38	13	49
Cheese	..	..	..	..	25	60	15
Margarine	..	..	..	..	51	—	49
Fish	..	..	..	..	81	6	13

Increased production in Great Britain is possible, without extending the area farmed, by taking full advantage of the latest scientific advances, and practising the most up-to-date methods. In any case it would be a suicidal policy to allow further reduction in the arable area to take place, and though the corresponding increase in grass land would mean more livestock, the increase would be far less than often supposed. It should also be pointed out that the conversion of arable land into high-class meadow or pasture is a long and expensive process. The mere "tumbling down to grass" which has been going on for so many years does not mean the automatic growth of herbage well suited for grazing or haying.

As suggested elsewhere (Part I., p. 128), the solution of our home agricultural problem is largely to be sought on the business side. Reduction in the cost of transport is, of course, urgently necessary, and many of our distributive methods need thorough reform and reorganization. Even without any form of protection or subsidy it should not be an impossible task to adjust the economics of the industry so that farmers would secure reasonable profits and labourers receive a living wage. It is extremely unlikely, however, that the task will be seriously attempted in the immediate future, for the alterations in our methods would almost certainly have to be on the *co-operative lines* which have been

adopted in Denmark and some other countries with such conspicuous success, and these do not appeal to our agricultural community taken as a whole. It has been estimated that between £200,000 and £250,000 is wasted in the passage of agricultural produce from the home producer to the home consumer, and if only we could save a substantial part of this our agricultural industry would be placed on a sound footing.

An expert on co-operation, Mr. Montague Fordham, has recently published a brief account of Danish methods, the chief points being as follows:

“The Danish success in organizing distribution arises, if my information be correct, from the adoption of certain underlying ideas which have not been applied at all to English agriculture; they do not, indeed, enter into the modern English co-operative system, though they were formerly well known in England. Substantially, the Danish system is this: The distribution of produce is in the hands of a group of organizations that form what is really a co-operative trust. This trust, though not, I understand, a perfect organization, has in effect monopoly of the distribution of at least a large part of the farm produce. The trust fixes national standard prices to the farmers; it is non-profit-making, and is controlled by the farmers themselves. It appears that the economies in distribution arise not so much from the co-operative system as from the monopoly; at the same time, the standard prices give an entirely different motive to the Danish farmer than that which drives the British farmer, for the Danish farmer's clear path to success is through increased production and improved quality. Moreover, the system of monopoly, co-operation, and standard prices together take from the Danish farmer responsibility for the business side of agriculture, and he settles down to farming—his proper function. The whole system creates a national policy of production.”

“The lesson of Denmark is, to my mind, this: that any partial co-operative scheme for distributing agricultural produce in England will have no great value; what is necessary is the combination of monopoly, co-operation, and standard prices. . . . Any scheme would involve the absorption of present dealers and intermediaries into a non-profit-making trust and a certain amount of gradual elimination of individuals and interests, which might take the form in many cases of transfer to other work.” It is suggested that were a co-operative organization of the kind indicated established in this country it would speedily effect such economies that “. . . we might expect promptly to reduce retail prices 10 per cent., introduce a legal minimum wage of £2 per week, and yet secure for farmers, if that were justified by facts, an increased profit of somewhere about 10 per cent. At the same time we should create an impulse for production which ought to have great results in the increase of output and employment” (*The Times*, October 4, 1923, p. 13).

Our *free trade policy* was originally adopted in order to secure, among other things, cheap food for the purpose of reducing the labour bill in manufactories, thus enabling manufactured goods to be produced at minimum cost. Even, however, when urgent currency questions have been settled so that foreign

exchanges have once more become normal, we shall be at a disadvantage in competing with Continental countries where labour is cheaper. There are several reasons why the labour bill in such countries should be relatively less than in our own, but the only one calling for attention here has to do with food. None of our competitors in trade are so much industrialized as ourselves, which means that they have not neglected food production to the same extent, as may be realized by considering France, Belgium, or pre-war Germany. And it may be stated, in general terms, that the less a country depends on imported food so much the more cheaply can its workers be fed; hence a reduction in the labour bill and the cost of manufactured goods. But this is only true when production and distribution of food are thoroughly organized. When, as in this country, there is large waste of money incurred during the passage of commodities from producer to consumer, home-grown food is apt to be dearer than that of comparable quality imported from overseas.

There is another reason which makes the cost of living in this country relatively high—*i.e.*, the expensive and wasteful character of our *cooking*. It may be difficult, or even impossible, to alter our traditional methods, but it is common knowledge that many of the Continental peoples surpass us in the art of preparing nutritious and appetizing meals at minimum cost.

During the War there was a conscription of brains that secured us victory, and there can be no doubt that our collective wisdom and experience, theoretical and practical, if focussed and concentrated, are fully competent to demonstrate how best to prevent further decline in British agriculture. Like foreign policy, our policy with regard to food production should be continuous, progressive, and absolutely independent of party.

FOOD PRODUCT FACTORIES.—To produce such commodities as butter, cheese, bacon, and ham of uniform quality and on a large scale the factory system is essential. The advantages of such standardized mass production are sufficiently obvious, and are well illustrated by such Dominions as Canada and New Zealand, or Denmark, Sweden, and the U.S.A. among foreign countries. The same method has done much for Irish dairying, but there is still a great deal of room for enterprise of the kind in Great Britain.

POULTRY.—Mention has already been made of the importance of properly bred stock as against mere "barn-door fowls" and the like. Our methods of poultry-keeping have greatly improved of late years, eggs for the most part are properly graded and packed, and our knowledge of poultry diseases has increased. Opinions differ very much as to whether poultry-farming as an independent industry is or is not a paying proposition. It need only be remarked here that a great deal depends on the cost of feeding, so that much interest attaches to the efforts now being made to promote mass production of maize by native labour in the Kenya Colony, the idea being to raise cheap poultry food.

Much might be done towards extending the poultry industry in Great Britain and Ireland and placing it on a sounder footing, by further improvement of stock and the adoption to a larger extent of up-to-date distributive methods. A recent letter to *The Times* (October 29, 1923), entitled "Lessons from Denmark

and Ulster," gives some interesting information with regard to the latter: "The history of the Danish egg industry is instructive. The Director of the Danish Farmers' Co-operative Egg Export Association, Mr. Moller, states that as late as 1890 the export trade was of small account, with prospects of a steady decline, the quality of the produce being poor and many of the eggs shipped as new-laid being very stale. In 1895 the Association began its work, the members binding themselves to conform to stringent rules. Since then all eggs have been stamped with the number of the member and the local society, so that it is always possible to detect any producer who delivers defective eggs. For the first offence a member is warned, and if he offends again he is punished by fines. The result of this policy is seen in the high reputation since attained by the stamped eggs exported from Denmark."

"The Ministry of Agriculture of the Government of Northern Ireland are now dealing with the same problem on somewhat similar lines, with a view to securing an enhanced reputation for the produce of the industry in their area. The value of the eggs sent from ports in Northern Ireland to Great Britain last year was approximately £4,000,000. The Ministry in a recently issued leaflet point out that the inclusion of stale or bad eggs in consignments to cross-Channel markets means that the Ulster exporters surrender their position to foreign competitors, and that it also opens the door yet wider to competition within their own borders. They warn those engaged in the trade that nothing could inflict more permanent injury on their industry than the placing of inferior eggs on the British markets, and that an increasing number of competitors are prepared to supply eggs of first-grade quality." Part 3 of the Public Health Acts Amendment Act, 1890, provides for the infliction of heavy fines on persons offering or exposing bad eggs for sale.

HONEY.—Although the quality of the New Zealand and Australian honey now on sale in this country leaves nothing to be desired, there seems no reason why our home production should not be increased, though our proverbially capricious weather always stands in the way. But the conduct of the industry is not costly, and it utilizes a food-stuff which is produced without any expenditure on our part, and which is otherwise wasted. The spread of the Isle of Wight disease did much to discourage bee-masters, but now that the cause of the disease has been discovered further advances may be anticipated.

FISH.—Enough has already been said about British sea-fisheries, the more urgent problems connected with which have to do with distributive methods.

DOMINIONS WITH MAINLY EUROPEAN POPULATION

The production and export of meat by Australia and New Zealand have already been dealt with in Section II. The United Kingdom is their best customer, and the chief facts regarding inter-Empire meat trade in this direction are summarized by Mr. Alfred Mansell (*op. cit.*) in a very interesting way: "The value of pure-bred sires on the native breeds of cattle and sheep in all parts of

the world has revolutionized our meat supply and made these countries formidable competitors in the great race for supremacy. The one consolation that is left to home breeders is the fact that in a general way in the producing countries a continuous infusion of new blood is essential in order to prevent deterioration in the herds and flocks."

"The following information, kindly supplied by Messrs. Weddel and Co., Ltd., shows the growth of the trade in imported meat from the principal exporting countries, which has been entirely brought about by the grading up of their common stock by the use of pedigree bulls and rams, mainly imported from Great Britain and Ireland:

	AUSTRALIAN.		NEW ZEALAND.		SOUTH AMERICAN.	
	Beef (Tons).	Mutton and Lamb (Tons).	Beef (Tons).	Mutton and Lamb (Tons).	Beef (Tons).	Mutton and Lamb (Tons).
1880 ..	—	10	—	—	—	—
1890 ..	1,071	5,491	4,425	39,336	446	21,754
1901 ..	12,167	25,932	11,406	74,411	38,596	63,583
1911 ..	35,536	64,585	12,897	99,073	310,383	97,344
1922 ..	58,330	49,205	29,017	150,803	440,013	85,150

"Not only meat but by-products enormously increased, and since 1880 the imports of bacon, hams, butter, and cheese into this country show in some cases considerable expansion."

"It is interesting to note that as recently as 1880 only 10 tons of mutton and lamb reached these shores, whereas in 1922 we imported the colossal figures of 527,000 tons of beef, and 285,000 tons of mutton and lamb."

"This had only been made possible by the extensive use of pedigree sires on the ordinary or native stock of the respective countries. Argentina affords overwhelming evidence of what can be achieved by the use of high-class sires, for whereas in 1880 they sent us no beef or mutton, South America's export figures to this country for 1922 had grown to 440,000 tons of beef and 85,000 tons of mutton and lamb."

For *bacon and hams* the United Kingdom depends very largely on imports from foreign countries, particularly the U.S.A. and Denmark. There is room here for much larger importation of Canadian produce, with corresponding expansion of the Dominion swine industry. During the four fiscal years 1919-22 Canada exported the following amounts of bacon and hams, shoulders and sides (in tons): 1919, to U.K. 60,518, to all countries 62,344; 1920, to U.K. 110,472, to all countries 111,821; 1921, to U.K. 48,711, to all countries 49,117; 1922, to U.K. 49,331, to all countries 49,604. The way in which Denmark has developed her trade in pig products with the United Kingdom has already been mentioned.

The *dairy products* produced in the Empire are approximately equal to Empire requirements, but those of other countries are largely imported, though we may expect to see such imports decline in relative importance. The rapid progress of the dairying industry in New Zealand is of particular interest in this connection. On this question the Prime Minister of the Dominion, Mr.

Massey, made the following remarks in his speech to the Imperial Economic Conference on October 2, 1923: "New Zealand is rapidly becoming the dairy farm of the Empire. The development in connection with dairy products—butter and cheese—since the War has amazed me, and I have been watching it very closely, as all those present here will understand. Last year we exported from New Zealand nearly £17,000,000 worth of dairy produce. I believe no other country in the world exported so much to Britain, and we can go on increasing. The climate of the Dominion is particularly suitable for dairy farming, particularly in the North Island, and even in the South Island, where the climate is more like Scotland and England, dairy farming is developing, and to-day dairy produce is our principal export" (*The Times*, October 3, 1923, p. 7).

Australia is also increasing dairy production to a very large extent, as will be realized from the following net export figures (in tons) for 1913 and 1921-22: Butter, 1913, 33,834; 1921-22, 56,628. Cheese, 1913, 556; 1921-22, 5,625. Preserved milk, 1913, 770; 1921-22, 16,328.

Canada exported the following amounts of dairy produce (cream and milk in gallons, other products in tons) for the four fiscal years 1919-22: Cream (all to U.S.A.), 1919, 485,105; 1920, 795,780; 1921, 1,279,195; 1922, 1,671,678. Milk (all to U.S.A.), 1919, 827,973; 1920, 1,985,113; 1921, 1,508,618; 1922, 1,391,299. Butter, 1919, to U.K. 4,426, to all countries 6,098; 1920, to U.K. 1,756, to all countries 7,863; 1921, to U.K. 937, to all countries 4,348; 1922, to U.K. 1,658, to all countries 3,764. Cheese, 1919, to U.K. 573,597, to all countries 67,949; 1920, to U.K. 40,169, to all countries 56,427; 1921, to U.K. 54,755, to all countries 59,652; 1922, to U.K. 56,224, to all countries 59,754. Preserved milk, 1919, to U.K. 13,627, to all countries 22,673; 1920, to U.K. 13,813, to all countries 24,218; 1921, to U.K. 9,779, to all countries 21,941; 1922, to U.K. 7,223, to all countries 15,198.

Canada is making vigorous efforts to increase her output of dairy produce, and to secure a larger share of the trade in these with the United Kingdom. There appears to be a shortage of dairy cattle in the western provinces, and the Canadian Council of Agriculture recommends removal of the duty, so as to promote importation of stock from the U.S.A. The low prices of grain, though a serious matter for cereal farmers, are likely to further the interests of dairying and other branches of pastoral production.

Empire production of *poultry products* is approximately equal to Empire requirements, and the disorganization of the poultry industry in Russia and several other European countries, as a result of the War, has increased for the time being the possibilities of inter-Empire trade in poultry and eggs, especially the latter. Australia's net export of eggs-in-shell in 1913 amounted to 48,705 dozens; in 1921-22 it was 775,291. Canada's exports of the same commodity for the four fiscal years 1919-22 were (in dozens): 1919, to U.K. 632,921, to all countries 733,445; 1920, to U.K. 5,679,510, to all countries 6,000,528; 1921, to U.K. 6,266,169, to all countries 6,579,853; 1922, to U.K. 3,917,870, to all countries 4,399,534. New Zealand is also developing the poultry industry, especially as a valuable adjunct to dairying.

Although Newfoundland is at present largely dependent upon imported meat,

dairy products, and poultry products, sufficient of all these commodities could be produced in the Dominion for local requirements, as the conditions are favourable to an expansion of the pastoral industries to that extent. The chief external sources of imported food are Canada and the United Kingdom, the U.S.A. ranking next in order of importance.

Fish.—The Empire catch of food-fishes is undoubtedly more than equal to Empire requirements, the bulk being the production of the fisheries of the United Kingdom, Newfoundland, and Canada, some account of which has already been given. For these parts of the Empire it is not so much a question of increased production as of improvements in methods of preservation, where great advances have already been made, and in methods of distribution. Australia and New Zealand, however, have devoted themselves mainly to agriculture and the pastoral industries, their fisheries being relatively unimportant. In both cases there is some export of fish (the only important item in the Australian list being cured *bêche-de-mer*), but the imports are much more considerable. There are plenty of markets, Empire and foreign, in the southern hemisphere, for disposal of a very large volume of fish products.

PARTS OF THE EMPIRE WITH MAINLY NATIVE (NON-EUROPEAN) POPULATION

In those parts of the Empire coming under this heading which are developing the pastoral industries the improvement of all classes of livestock is being effected to an increasing extent, especially in the Union of South Africa and Rhodesia. Progress in this direction is necessarily very slow in British India, but good results are being attained. Some of the smaller Colonies, such as Jamaica and Mauritius, are also fully alive to the practical superiority of improved stock.

There is no doubt at all that *meat* and *dairy commodities* of good quality will be produced on an increasingly large scale, not merely keeping pace with local demands, but providing a large surplus for export. Opportunities for very considerable expansion of the pastoral industries are afforded by the Union of South Africa (and its Dependencies), Rhodesia, and East Africa, while the resources of British Guiana await exploitation. There are also a number of Colonies and Territories which, though chiefly engaged in the production of food or raw materials of vegetable nature, could easily encourage their pastoral industries to a reasonable extent, thus reducing their dependence on imported meat and dairy products. Ceylon, British Malaya, Fiji, and some of the West Indies are cases in point.

To develop fully the resources of the tropical parts of the Empire the continued prosecution of research on *fly-borne and tick-borne diseases* (some of which affect human beings while others are fatal to stock) is essential. The classical example is that of malarial diseases, which are disseminated by certain mosquitoes, and for which effective methods of control have been devised. It was by application of these measures that the construction of the Panama Canal, opening up an entirely new trade route, became a possibility.

The tick-borne diseases of domesticated animals at one time made stock-farming in East Africa almost impossible, but this difficulty has now been largely overcome by periodical dipping in suitably compounded chemical solutions, and the use of these is by no means limited to the hotter countries. In tropical Africa the tsetse flies are far more dangerous enemies than ticks, for their bites cause sleeping sickness in man and fly-disease, or nagana, in horses and cattle. Both diseases are included in the technical term "trypanosomiasis," because they are set up by microscopic animal parasites known as trypanosomes, which are introduced into the blood by the bites of infected flies.

Extensive tracts of country, "fly-belts," in Northern Rhodesia, Uganda, Nyasaland, and elsewhere, are so infested by these insect pests as to be extremely unhealthy or even uninhabitable, and they may seriously interfere with the passage of stock from one fly-free district to another. A new remedy, called Bayer 205, has now been tried in tropical Africa with promising results. It arrests and possibly cures sleeping sickness, and has good effects in cases of fly-disease among cattle, though the results here are regarded as less satisfactory. There is, however, a marked difference between infected cattle which have been treated and those that have not. The latter soon waste away and die, while the former remain in good condition and can be used for slaughter purposes. The drug apparently does not prevent cattle from contracting the disease, but it seems possible that further research on the same lines may ultimately lead to a much larger measure of success.

The *poultry industry* is gradually being developed in the Union of South Africa, Rhodesia, East Africa, British India, and parts of the West Indies, but an immense amount of work in this direction remains to be done. This branch can only be expected to progress rapidly in those parts of the Empire where dairying and pig-keeping are becoming important, for it is accessory to these and requires the same attention to detail.

The *fisheries* of the parts of the Empire under consideration are all in a more or less backward condition, but are capable of indefinite expansion. Their future mainly depends on the factor of European population, which at present is too small to do much for this branch of food production, being fully taken up with agriculture and the pastoral industries, to say nothing of the many other activities by which Empire resources of all kinds are being exploited.

SECTION IV

SUMMARY AND GENERAL CONCLUSIONS

A review of the Food Resources of the British Empire naturally leads to a number of conclusions, some of which have been indicated already, and which can be arranged under two headings—Production and Distribution.

PRODUCTION

The United Kingdom has been industrialized to such an extent that it is more dependent on imported food than any other country in the world. To make it completely self-feeding would be impossible, but the production of considerably more home-grown food would place us in a much stronger position in several ways: (1) A healthy and vigorous rural population is of the greatest importance for the well-being of the whole community. (2) The exigencies of National Defence demand that food production at home should not sink to a dangerously low level. (3) Reduction of imports is desirable wherever possible, in order to help in securing a favourable balance of trade. We pay for imported food, and other commodities, partly by the export of manufactured goods and partly by performing various services by shipping, insurance, and banking organizations. The large amount of British capital invested in certain other countries also entitles us to our share in the productions of those countries. In order to secure our commercial supremacy maximum production and export are necessary, as well as the maintenance and extension of the various services mentioned. Failing this the prices of imported goods, including foods, will tend to rise.

If agriculture continues to decline our position will become weaker and weaker as regards National Defence, and it would appear to be the duty of the State to decide how far this decline is to be allowed to go, if indeed it has not already gone too far for security in the event of war.

Supposing a conclusion on this matter to have been reached, the cost to the nation would have to be determined. Under present conditions the country would certainly be called upon to assist agriculture in order to arrest decline, for decline, of course, means that arable farming is not paying. It seems desirable to emphasize that financial assistance given to an industry as a matter of National Defence is comparable to a life insurance premium, or to expenditure on Army, Navy, or Air Force. Here is no question of party politics, but of the safety of the community, and such words as "protection," "subsidy," and "bounty" are purposely avoided because of their contentious significance.

As pointed out elsewhere (p. 72, and Part I., p. 128), an increased amount of food can be produced by improving practice, farming in general being raised to the high level at present maintained by a number of individual farmers. But considerable increase, in a comparatively short time, means putting more land under the plough. "Land under arable cultivation produces nearly three times as much food as when under grass, and employs ten times as many men. . . . If the arable land was increased to the area it occupied in 1872, by about 4 million acres, and chiefly devoted to wheat, the amount of wheat grown in the country would be raised to about 59 per cent. of our total requirements, and at the same time our production of cattle food would be increased rather than diminished. As British Possessions already send us wheat to the extent of over 30 per cent. of our requirements, all the wheat we require to within 10 per cent. would be produced within the Empire. This extension of arable land is still below the limit of what is possible; moreover, a further increase of production is easily possible by the intensification of our existing methods of cultivation and manuring" (A. D. Hall, *Agriculture After the War*, 1916, pp. 127 and 128). It is not intended to suggest that the figures quoted from Sir Daniel Hall represent the precise amount of production essential for national security.

The United Kingdom has been accustomed to rely entirely upon imports for one essential food-stuff—*sugar*. By remission of duty, and in other ways, the Government has endeavoured to promote the beet sugar industry in this country, but so far with only very partial success, for various reasons. Large tracts of land in England are well suited for growing beet of high sugar-content, and given a satisfactory supply of roots and the full utilization of by-products there seems no reason why beet sugar should not be manufactured at a reasonable profit. It must be remembered, however, that the cultivation of sugar beet involves much labour, and this is relatively cheap in the Continental countries where this particular branch of production has flourished.

The sea-fisheries of the United Kingdom constitute a second primarily essential industry, indispensable not only with reference to food production, but as a recruiting ground for the Royal Navy and mercantile marine (Section II., p. 22). Our fishermen catch the greater part of the fish consumed in this country, but, as we have had cause to know, the supply is liable to be greatly restricted in war. As in the case of agriculture, State assistance given to the sea-fisheries industry during a time of acute depression might be regarded with justice as a measure of National Defence, not, however, because of its food-securing function, but in respect of its paramount importance as the cradle of the Navy.

Whatever may be the ultimate policy of the State in regard to food production in the United Kingdom there can be no doubt that the food resources of the rest of the Empire are practically without limit, and in some cases they are being developed in a remarkable way. Instances of this development have already been given, in both parts of this work, the most remarkable of these being afforded by Canada, South Africa, Australia, and New Zealand.

It is an obviously desirable policy to encourage the Dominions, Colonies, and Territories, and also the Empire of India, to maintain and increase their production of food. And it is equally desirable that food imported by any part of

the Empire should be, so far as possible, of Empire origin. There are certain food-stuffs for which the Empire, at present, is largely dependent on foreign countries, and increased production of such food-stuffs, of which *sugar* and *maize* are the most important, ought particularly to be promoted. The Imperial output of cane sugar is capable of indefinite extension, and the Canadian beet sugar industry can be considerably expanded. For increased supplies of maize we can look with confidence to the Union of South Africa and parts of British East Africa.

The Empire is quite capable not only of feeding itself, but also of producing a surplus for export to certain foreign countries, many of which are already customers for one commodity or another. Australian food-stuffs, for instance, are purchased by China and Japan, while the U.S.A. are customers of Canada, and the Union of South Africa exports food to a number of European countries.

Furtherance of increased food production throughout the Empire is possible in various ways. *Migration* of suitable persons from the overcrowded United Kingdom to sparsely populated Dominions should obviously be promoted in every possible way, and the rural development—as distinguished from urban growth—of Australia and Canada must largely depend on the success of migration schemes. Failing British settlers, some parts of the Empire seem likely to afford a permanent home to an increasing number of foreigners of various nationalities, while on the other hand a large number of persons from the United Kingdom emigrate every year to the U.S.A., and thus are lost to the Empire. The precise number for the year 1922-23 was 131,159, but how many of these are now engaged in food production is unknown, most probably a small minority.

Indiscriminate migration is, of course, eminently undesirable, and in this, as in all other Imperial matters, the closest co-operation is essential between the authorities of all parts of the Empire, and this primarily important question will doubtless be most carefully considered by the permanent Imperial Economic Committee that has recently been appointed.

For their general development, including the exploitation of food resources, the Dominions and Colonies, of course, need *capital*, and in some cases—*e.g.*, Union of South Africa, Rhodesia, and Kenya—migrants without capital are not wanted, as labour is supplied by natives (Part I., p. 138).

The outstanding points in Empire organization were summarized by the President of the Board of Trade, Sir Philip Lloyd-Graeme, in his opening address to the Imperial Economic Conference, part of which is here quoted (from *The Times*, October 3, 1923, p. 7).

“ Our position in this country is well known to you. You have watched our industrial development. That development has involved an increasing dependence on export trade, an increasing dependence on imported materials, and our capacity to buy those materials is dependent principally on our capacity to maintain our export trade by sales overseas. . . . To-day our export trade is far below its pre-war volume. This deficiency has been and is to-day reflected in unemployment of a duration and on a scale without precedent. . . . Looking at the economic history of the past, there are . . . two outstanding lessons.

The first is that the surest guarantee of material prosperity in this country is the development of fresh resources, new fields, overseas. The most prosperous period in our industrial history was . . . unquestionably the period of easy success between 1850 and 1870, a period which coincided with enormous development in America and in other parts of the world.

"The second lesson may be drawn from the epoch which followed. The effects of the long period of industrial depression which came shortly after the Franco-Prussian War are common knowledge. But what is not so well remembered is that during that depressing time, while for years our export trade to foreign countries showed no increase, while our population was steadily growing, one thing above all others enabled us to carry on: the fact that our exports of manufactures within the Empire almost doubled in those difficult years. And let us remember that it was the development taking place in the Empire itself that made that increase of trade possible. We are all of us anxious to do the greatest possible amount of trade together. You need for the development of your great territories population and capital. . . . And, on our part, our needs are complementary."

At present many parts of the Empire are still mainly or largely occupied in agriculture, the pastoral industries, and—in a few cases—fisheries. Industrialization, however, is making progress in such Dominions as Canada and Australia, and though we cannot expect any British Possession to remain content with producing food and raw materials, it is to be hoped that over-industrialization, of which the United Kingdom is so serious an example, may never extend throughout the greater part of the Empire. Though such a possibility is at present remote, it must be taken into consideration in devising schemes to secure the solidarity and endurance of the British Commonwealth of Nations.

Some of our great Dominions produce most of the essential food-stuffs they require for their own consumption, and also export large quantities, but certain of our Colonies of exploitation, such as those in West Africa or Malaya, are in a different position. Here the main products are of industrial value, and imports of food for the white populations are necessary. It is out of the question to urge such parts of the Empire to specialize in food production with a view to export. As a matter of fact some of them are of importance with reference to subsidiary foods, such as tea, coffee, cocoa, and condiments, which are not considered in this volume (*see* Vol. IV.). It is obviously desirable, however, that the essential foods should be produced so far as possible for local consumption.

DISTRIBUTION

Distribution is really the business side of food production, and, when taken in the widest sense, includes marketing as well as transport. For Great Britain the whole matter has been carefully investigated by the Departmental Committee on distribution and prices of agricultural produce, the interim reports of which have already been drawn upon for some of the material embodied in this work.

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The final report of the Committee has recently been published (January, 1924), and is of importance for producers and distributors alike. Some of the chief facts and conclusions are well worth quotation in this place. The relation between market prices of produce and the retail prices of food-stuffs for 1922-23 is shown by the two following tables:

PERCENTAGE INCREASES IN THE MARKET PRICES OF THE CHIEF KINDS OF AGRICULTURAL PRODUCE AS COMPARED WITH THE AVERAGE PRICES IN THE CORRESPONDING MONTHS OF THE YEARS 1911-13.

Commodity.	1922.				1923.							
	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.
Wheat ..	23	24	32	32	33	28	27	31	37	38	39	29
Barley ..	26	29	34	17	20	12	8	11	16	17	12	9
Oats ..	31	33	38	36	43	39	36	39	42	41	41	30
Fat cattle ..	58	49	48	48	61	61	54	51	53	52	45	46
Fat sheep ..	90	90	87	81	103	97	94	100	103	83	72	76
Fat pigs..	84	85	94	94	102	88	77	71	72	69	54	52
Poultry ..	85	77	75	86	81	80	81	75	77	87	79	61
Eggs ..	96	104	98	63	86	46	55	37	43	40	36	68
Milk ..	70	90	90	90	90	90	87	70	63	53	57	67
Butter ..	76	71	72	73	73	72	70	68	40	33	37	48
Cheese ..	41	36	55	60	85	88	95	92	42	44	54	67
Potatoes..	1	3	8	7	-1*	-5*	-12*	-28*	-28*	-31*	66	80
Hay ..	52	45	45	47	43	42	42	40	41	42	38	34

AVERAGE INCREASE IN THE RETAIL PRICE OF CERTAIN FOOD-STUFFS ON THE FIRST DAY OF EACH MONTH, SEPTEMBER, 1922, TO SEPTEMBER, 1923, AS COMPARED WITH JULY, 1914.

[Commodity.	1922.				1923.								
	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.
Bread ..	67	61	59	59	57	56	55	54	53	53	53	52	52
Flour ..	62	55	54	54	53	52	50	47	46	47	47	47	46
Fresh beef ..	79	75	72	70	69	70	70	68	68	68	67	67	66
Fresh mutton	95	90	87	85	86	89	92	92	92	89	86	85	83
Bacon ..	98	100	92	89	83	74	64	60	58	57	54	54	68
Eggs ..	99	138	191	211	165	140	77	34	20	27	31	51	98
Milk ..	64	66	98	103	101	101	100	98	62	57	56	58	61
Butter ..	78	81	81	80	72	74	79	77	48	34	31	41	51
Cheese ..	51	49	56	75	79	87	91	98	78	60	51	51	62
Potatoes ..	19	7	4	3	2	2	- 2*	- 4*	- 6*	- 8*	80	108	81

* Decrease.

The "spread" between producers' and consumers' prices apparent in these tables is commented upon thus:

"Our investigations have led us to the conclusion that the spread between producers' and consumers' prices is unjustifiably wide. Taken as a whole, distributive costs are a far heavier burden than society will permanently consent to bear. Certain intermediaries between the farm and the home are, of course, indispensable for the great bulk of produce grown in these islands. Whatever system of collection, treatment, and distribution of the products of British farms may be evolved in future, it appears that the services now rendered by different types of intermediaries are typical of those which will always be required. Moreover, the consumers' demand for food-stuffs which have been prepared ready for immediate use involves increased ancillary services of treatment and manufacture. But economies can be made, and processes of collection and distribution can be shortened. In certain cases, for instance, it should be possible to concentrate in the hands of one intermediary the successive functions now performed by several. Again, the balancing of supply and demand, although an essential service performed mainly by wholesalers, has, on the whole, developed in a somewhat haphazard manner. With better organization the regulation of supplies could, to a greater extent, be performed near to the place of production, with a consequent saving in handling and transport."

"In our interim reports we have instanced unjustifiable distributive charges, and we have recorded our view that individual traders and groups of traders are, in some cases, still making higher profits than are warranted by the services they perform. These profits should be reduced. The view that middlemen as a class are rapacious, and that existing systems of marketing and of distribution are chaotic, is perhaps natural on the part of those who have not made a comprehensive survey of the costly and complicated processes of collection and distribution of agricultural produce. While we cannot subscribe to this view, we have no doubt that if the present system were carefully examined by those who are primarily interested in it, whether as producers or as distributors, modifications could be introduced which would render it more efficient and less costly. In some trades there are now too many profit-making agencies engaged in the process of distribution. Public interest demands a far more determined effort on the part of all concerned to bring about reform and to increase the efficiency of the marketing and distributive machinery as a whole."

In dealing with the "producer and his market" the report emphasizes the importance of a "marketing sense" and the standardization of produce. In respect of the former it is remarked that:

"In the new circumstances of world competition a knowledge of the marketing and distributive processes is essential to the producer. Only when thus informed can he adapt his methods of production, the goods he produces, and the preparation of these goods for market, to the needs of the buying public. This, together with a capacity to compare values and judge prices, is the marketing sense. It is possessed by the more progressive agriculturists, but if the British producer is to occupy his proper place in the home market it must be cultivated more generally."

"Representative organizations of producers should also make it their business to study closely the systems of marketing and distribution in order that they may by organization and by collective bargaining, on either a local or a national basis, secure for their constituents the most favourable terms in competition with well-organized supplies from other parts of the world."

Stress is then laid on standardization as "a first principle of modern commerce. It enables goods to be bought and sold on the faith of their description; it renders valid a comparison of prices between lot and lot, and between market and market; it is the essential foundation of advertisement. The producer whose goods are properly graded according to recognized standards is in a position not only to strike a satisfactory bargain with the distributor, but also to market his produce under his own brand or trade mark. On the other hand, produce that is of varying quality induces an element of doubt in the mind of the buyer, who protects himself against loss by offering a lower price. These are no doubt truisms, but they merit the earnest consideration of the home producer."

The bacon industry is taken as an illustration (*cp.* p. 19).

Food distributors next receive attention, and the Committee consider that these "... as a whole must be prepared not only to modify their margins in future as the cost of materials, labour, transport, and other incidental items falls, but, in the meantime, to make a concerted and conscious effort through their various organizations, most of which either actually came into existence or were immeasurably strengthened as a result of war conditions to increase the effectiveness of their trades and to work steadily forward in the direction of devising less expensive methods, and of adapting their trading policies to the fundamental requirements of economical distribution. It is in their own interests to do so. At present most of these organizations appear to exist mainly for the purpose of trade defence, and their activities are largely protective and propagandist in character. Few have any marked constructive tendencies; fewer still have learned to abandon a purely sectional for a wide and progressive national outlook."

"... There is no reason why producers of goods should bear the whole of the burden of a depression in prices or why consumers should not be able to enjoy the full advantage of reductions in wholesale prices and assist the producers by a greater and quicker consumption of goods, so that industrial and commercial equilibrium may be more quickly established. On every ground it is better that a readjustment should be made by the trade itself rather than by legislative compulsion, with all its deterrent effects upon initiative and development."

The transportation factor is then discussed, rail, road, and post being taken successively. As to rail the Committee say:

"The general impression we have received from our evidence is that the railway companies should now pursue a far more progressive and adaptable attitude towards agriculture. They are themselves realizing the benefits of more efficient organization by combination, as also are agriculturists, and they can now, if they will, get into much more intimate and effective touch with the special needs of agriculture. It is no exaggeration to say that the financial prosperity of all

primary producers depends on the cheap and efficient transport of their produce to consuming centres."

We are told, however, that "there are many signs of the new spirit of progress in which railway managers are setting themselves to meet the industrial needs of this country, and we are satisfied that equal benefit would result from its extension to agriculture."

The greatest importance is attached to "the new progressive policy of road development and improvement," and a greatly extended use of motor-lorries advocated.

"Where older methods are still employed the primary haulage of produce from farm to railway station or market would seem to be a relatively costly stage in the marketing process. Producers may by combination and organization secure economies at least as great as those attainable in any other stage of marketing. In these days of extensive road improvement larger loads and greater speed should effect substantial savings."

With reference to the postal service as a means of distribution it is remarked that:

"The present high parcel post rates constitute a formidable hindrance to the most economical means of conveying many classes of farm produce to urban consumers. We are informed that these rates are in excess of those charged in other progressive countries and that they tend to deprive both producers and consumers of one of the easiest means of dispensing with intermediaries and deriving mutual benefit from the direct transit of such commodities as eggs, cheese, butter, cream, poultry, bacon, and certain fruits and vegetables; they discourage that larger home production which will open the way to larger postal revenue and should, if possible, be reduced."

In dealing with the wholesale stage the tendency towards large trading units is noted: "To the extent that it brings cheapness and efficiency into the system of distribution, the large-scale business is clearly a public advantage, though there is always a point beyond which further growth may lead to a weakening of administrative control and a consequent inflation of overhead and other charges." Further: "The position of the farmer as a seller, and of the retailer as a buyer, is bound to weaken in corresponding ratio as consolidation proceeds. It is to be noted, however, that the farmer is in a weaker position than the retailer, since the wholesaler is not always able himself to engage in retail distribution, and it is often to his interest to foster the goodwill of retailers by allowing them an adequate margin of profit."

"In our view, organizations engaged in the distribution of food are under an explicit obligation to dispel suspicion by fully and frankly publishing the general results of their trading. Nothing can contribute more to social unrest and instability than an apprehension, however groundless, that exploitation is rife in the distribution of food. The future is undoubtedly with the big unit, but its toleration will be conditional on an adequate appreciation of the requirements of the common weal."

Retail distribution is discussed at some length, the present state of things being partly ascribed to the "heritage of control," which has led to a "loss of touch with values."

"There are signs that consumers as a whole are re-acquiring a knowledge of relative values. Retail distributors, on the other hand, have not yet fully shaken off the effects of the control period, and desire nothing better than to be left in undisturbed enjoyment of their profit margins and to restrict their turnover to an amount which will yield a comfortable return with the minimum of capital outlay and of risk, trouble, and inconvenience to themselves."

"Retailers as a class work hard and serve the public well. They may be only vaguely, if at all, conscious of the residuary and benumbing influence of control to which we have referred. That it exists there is, in our view, little doubt. That it will in course of time disappear is equally beyond question. Its disappearance can be accelerated only by steady and unremitting pressure on the part of producers and consumers."

Attention is directed to the difficult case of "under-sized retail units," which include "a large proportion of small establishments the excessive costs of which, in the long run, render them powerless to provide the real and effective competition capable of reducing margins." It is stated that "surprisingly few of the smaller traders keep accounts in such a way as to show the relationship of the constituent elements in the cost of their respective undertakings." Hence the following recommendation:

"We consider that training in business methods is needed among retail food distributors generally. It would be a step in the right direction if young men who enter retail businesses were encouraged to take up the study of book-keeping, shop management, and the principles of retail merchandizing. With an improved understanding of the economics of their trade which such instruction would provide, retailers should find it possible to reduce the costs of their trading operations."

The consumer's responsibility also receives consideration. Consumers can "appreciably assist themselves in present circumstances" by "exercising the right of discrimination as between retailer and retailer. . . ." They should also realize "that their ever-increasing demands for comfort, convenience, and service are largely responsible for the high costs of retail distribution to-day. . . . It is clear that consumers who insist on extensive service must be prepared to pay increased prices accordingly." In certain cases: "Municipal retail markets . . . would admittedly afford consumers an opportunity of buying their food more cheaply."

The case for co-operation is presented at length, and the causes of past failures considered. The general opinion is expressed that "the co-operative organization of farmers on the right lines and in the right places should be encouraged." To do this, however, is not altogether easy.

"The application of co-operative organization to farming generally is, indeed, far less straightforward and simple than is popularly supposed. An added difficulty is the independence of the farmer himself, who, by tradition

and environment, is accustomed to depend on his own efforts. The British farmer is intensely individualistic. He does not willingly surrender his own judgment or delegate his authority to others. He is primarily concerned with production, and, though usually a keen business man, he shows little inclination to associate with others in large-scale groups to employ the skill and talent necessary to enable him to compete effectively with imported supplies. The result is that farmers tend to compete with one another, and thus depress the price of their own produce without affecting materially the position of their overseas competitors who, in the market, combine to function more and more as a limited number of large-scale trading units. The farmer stands alone at the end of a long line of distributive agencies. As an individual, his position as a seller is inherently weak. His economic relations with the community in general grow gradually more and more complex. His isolation is rapidly vanishing. He can no longer ignore the forces which surround him; he cannot dissociate himself, if he will."

The final sections of the report deal with the collection and publication of price statistics, including the broadcasting of market intelligence; the media of exchange, which require further standardization; and the need for continuous investigation. Under the last heading attention is called to the activities of our foreign rivals in trade:

"Valuable work is being undertaken by Government Departments in various countries, notably in the United States of America, where the Department of Agriculture has been entrusted with the study of the problems not only of marketing, but also of distribution. A Bureau of Farm Economics has been established which consolidates into one group the divisions of the Department dealing with the costs of production, the adjustment of production to market conditions, marketing, and distribution, including co-operation, and the statistics of production, distribution, and consumption. This reorganization has been effected to meet the growing demand of farmers and those dealing in farm products for world-wide surveys and studies of all the economic factors influencing prices and the movements of products from producer to consumer. The methods adopted in other countries, and especially in the United States, should be closely studied by those responsible for similar work in this country."

Several Government Departments and many local authorities in this country are concerned, in one way or another, with the production, distribution, and marketing of food, and it would appear that there is room for further adjustment and correlation of their several functions. (The case of Fisheries has been dealt with earlier in this volume, p. 23).

The three following paragraphs from the last pages of the report have special reference to the Departments of Agriculture:

"So far as this country is concerned, we are convinced that it is in the national interest that the Departments of Agriculture should devote far more attention to marketing and to commercial problems than has hitherto been the case. Not the least important of their duties should be to keep a close watch on the whole system of marketing and distribution of agricultural produce, while the vast

amount of material which we have accumulated and published in the course of our enquiry should be carefully collated and kept up to date."

"We understand that where the duties of other Departments bring them into touch with agricultural interests the Departments of Agriculture are at present consulted in order that no action may be taken without due consideration being given to its possible effect upon the agricultural industry. We attach a good deal of importance to this point. Indeed, some instances have come to our notice in which sufficient weight does not seem to have been given in Departmental Regulations to their possible effect on the production, distribution, or marketing of home produce."

"We are of opinion that continued investigation and supervision by the Departments of Agriculture should afford effective safeguards and tend to the restoration of confidence among consumers generally. The public rightly may be assumed to feel the need for some authoritative body to which it can look for information relating to the costs incurred and the profits realized in the distribution of food. Only by the widest publication of the essential facts can any uneasiness that may arise in future be either justified or allayed, and in fulfilling this function the Departments of Agriculture should receive the hearty co-operation of other Departments of State, as well as of the various trading organizations concerned."

From what has just been said it will be realized how complex are the food problems in Great Britain. Still more difficult are those which arise in connection with the distribution of the food products of the whole Empire, especially as in many cases conflicting interests are at stake.

The development of Imperial food resources requires to be conducted on a uniform and carefully-thought-out plan, and the spirit shown in last year's Imperial Economic Conference by those representing all parts of the Empire makes it abundantly clear that there will be no lack of practical co-operation for the furtherance of inter-Empire trade, not merely in food products, but in commodities of all kinds. There can be no doubt at all that the bonds of Empire were more closely drawn during the War than they had ever been before, and the future will largely depend on the maintenance of the good feeling that now exists as between Britain and the Britains overseas. Migration affords the most important means of maintaining and intensifying such good feeling, which is of the greatest practical value, for it facilitates the carrying out of measures for promoting the prosperity of all parts of the Empire.

Communications are of primary importance in building up trade between the constituent parts of the Empire, which are scattered all over the world. Here this subject can only be alluded to in passing, as it falls within the purview of Vol. XII. (Transport) of this Series. The future of British Africa and Australia, for instance, is largely bound up in the extension of railways, which have done so much for Canada. A good deal of enterprise is fortunately being shown in this direction. Kenya Colony is to remain connected with the Tanganyika Territory by retention of the line constructed for military purposes during the War between Voi on the Uganda Railway and Kahe on the Tanga Railway. Kenya is also to be linked up with the Uganda Protectorate by an

extension of the Uganda Railway to Jinja, on the northern shore of Lake Victoria Nyanza. Even more important is the question of shipping, where we are exposed to keen competition with foreign rivals. As a concrete case the copra trade of the South Sea Islands may serve. This was formerly in the hands of Australia, but has now been captured by Germany. Luderitz, in the Territory of South-West Africa, may be mentioned as an example of possibilities. This is well placed for serving as a port for cattle boats plying to the United Kingdom, and by eastward railway extensions an outlet would be afforded for the export of stock from the northern parts of the Union of South Africa and from Rhodesia.

The *regulation of the supplies* of Empire food products is one of great difficulty and complexity, in order to prevent either glutting or depletion of markets, for the former unduly diminishes the legitimate profits of the producer, and the latter penalizes the consumer by causing a sharp rise in prices. In this connection we must remember the exceedingly varied nature of the sources of supply, associated with the maturation of crops at different seasons.

Adjustments should be aimed at for securing adequate quantities of the main food-stuffs at fair rates, as otherwise the maintenance of prices at a reasonable level is out of the question. We have had abundant cause of late years to realize that such maintenance is essential to the well-being and tranquillity of communities. While the proper development of all resources is important, it must be remembered that food is the primary necessity of life, so that food resources must be first considered when schemes for the advancement of a country or an Empire are under consideration. Sharp rises in price of essential food-stuffs cause resentment and apprehension on the part of consumers, especially when they do not understand the reasons for such rises, and lead to a condition of discontent and unrest, which is prejudicial to progress, and militates against the interests of trade in general.

On the other hand, sharp falls in price seriously lower the profits of food producers, and tend to reduce production to an undesirably or even dangerously low level. Hence, for instance, the serious decline in the wheat production of the United Kingdom. Imperial food policy, to be successful, must satisfy the reasonable demands of producers and consumers alike, and endeavour to prevent unnecessary waste in the passage of food products from the former to the latter.

Fiscal Policy.—We are here concerned with facts, not theories, and this is no place to debate the much vexed question of Free Trade *versus* Tariff Reform, though the exigencies of National Defence must take precedence of economic theory, and to rely upon foreign countries for the bulk of our essential food-stuffs would be ill-advised if not dangerous. The position, however, as regards fiscal policy is exceedingly complex. Broadly speaking, the United Kingdom stands for Free Trade, while the Dominions have adopted a substantial measure of Protection, and successful co-operation for the development of Empire resources must discover some *modus vivendi*. There is already a certain amount of Imperial Preference, but as for the present the electorate of the United Kingdom have apparently expressed their disapproval of thorough-going measures in that direction, a number of difficult problems involving protected industries await solution. Australia, for example, encourages the export of

chilled and frozen meat by subsidy, and this intensifies the competition in the markets of the United Kingdom between such Australian products and freshly killed British meat.

Every self-governing part of the Empire must, of course, be free to regulate its own fiscal policy in accordance with its own ideals, and to develop its resources in the way best adapted to its special circumstances, but it may nevertheless be possible to arrive at compromises calculated to promote the interests of the Empire considered as a whole.

So far as food is concerned, the interests of the whole Empire would be served by measures calculated to reduce our indebtedness to foreign countries as sources of supply, and to increase the volume of inter-Empire trade. It may also be said that the integrity of the Empire depends in no large measure upon the ability of the densely populated home country to prevent itself from being starved out in the event of war. Under such circumstances were the United Kingdom forced to capitulate some of the other parts of the Empire would run serious risks of annexation. It is from this point of view, as already emphasized, that the decline of British agriculture is to be regarded as a matter of extreme gravity.

Could we be sure of universal peace there is no doubt that many questions of trade and commerce would be allowed to settle themselves by a process of natural evolution. In that case food production would be relegated more and more to countries having cheap labour at their disposal, and even under present conditions there is a tendency in that direction. Currants afford an illustration that recent controversy has rendered familiar. The United Kingdom has been accustomed to purchase the bulk of this commodity from Greece and the Levant, where the standard of living is low and labour is correspondingly cheap. It so happens that both Australia and South Africa are able to produce currants of high quality, and are doing their best to increase their output of these and other dried fruits. What ought to be the policy of the Empire in such cases? That is the kind of question which will constantly arise in connection with inter-Empire trade, and to which an answer must be given.

It must be remembered, however, that cheap native labour is available in many Colonies and Territories, to say nothing of the Empire of India and the Union of South Africa. The competition in food products between ourselves and foreign countries only becomes acute in cases where producers of British race are pitted against either badly paid Europeans whose standard of living is relatively low, or coloured natives under foreign control. And competition of the kind is by no means limited to food products. Even when the conditions for production are comparable, as between part of the Empire and a foreign country, the latter may be favoured by geographical position. Argentina, for example, has an advantage over Australia in the export of meat to the United Kingdom, and Denmark is so near the home country that her dairy produce, bacon, and eggs can be placed on the British markets at less cost than the same commodities coming from Canada or New Zealand.

Empire Markets.—The depression of British trade and commerce is a natural result of the loss of many European markets, which before the War

absorbed great quantities of our manufactured exports. It would be idle to pretend that the Empire is a self-sufficing unit, but at the same time it must be admitted that inter-Empire trade has not been developed to anything like the extent possible. We must, in short, endeavour to keep going by making use of our own resources until trade conditions in Europe have become more normal. Here, again, in the course of time, sound migration schemes are likely to prove of great importance. On the one hand they help to relieve congestion of population in the United Kingdom, and on the other they recruit the man-power of the Dominions, and play their part not only in production, but also in developing Empire markets.

The vast extent of the Empire, entailing great expense in travelling from one part of it to another, has proved a considerable drawback in respect of the development of inter-Empire trade, while various foreign trade relations have resulted from geographical factors. Such, for instance, are those which obtain between the United Kingdom and the adjacent Continental countries; Canada and the U.S.A.; and the U.S.A. with the Bahamas and Bermudas.

Comparatively few firms can afford to send travellers to the more distant Dominions and Colonies, but it might be possible for various trade organizations to appoint individuals representing the interests of groups of firms. Letters, catalogues, and other postal communications lack the personal touch and are relatively ineffective.

Education.—In spite of much good work of exceedingly varied kind that is being done to disseminate what may be called Empire Knowledge among the peoples of the Empire, there is still a good deal of ignorance regarding essential facts. The intimate fellowship that existed during the War has proved of immense propagandist value, but it is now (1924) more than five years since hostilities ceased, and a new generation is rapidly growing up. Fortunately for us, the British Empire Exhibition is affording a unique opportunity of renewing vital contact, especially as it follows an Imperial Economic Conference of unexampled importance. The Exhibition is an object-lesson or series of such lessons on the largest scale in illustration of Empire resources, attended with the further advantage that citizens from all the Dominions and Colonies, and the Empire of India, are meeting those who live in the home country.

There can be little doubt that inter-Empire trade will be greatly stimulated as one result of the Exhibition, and it is much to be hoped that another result will be the very thorough organization of Empire Knowledge as a subject of education. Not only should it occupy a definite place in the curricula of schools of all grades, and also in those regulating university studies, but the interchange of teachers and pupils might well be arranged to a much larger degree than has so far been done.

The cinematograph seems destined to play an increasingly important part in education, and no doubt the splendid series of films specially prepared for the Exhibition to illustrate life overseas will become available for ordinary class instruction. If so, they should do much to direct the attention of older pupils to the possibilities afforded by migration.

APPENDIX

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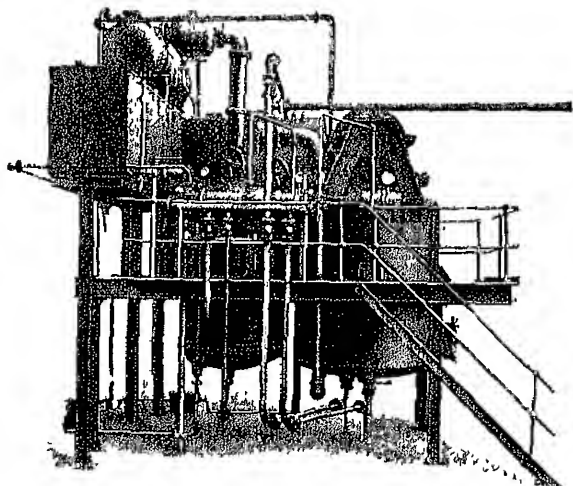
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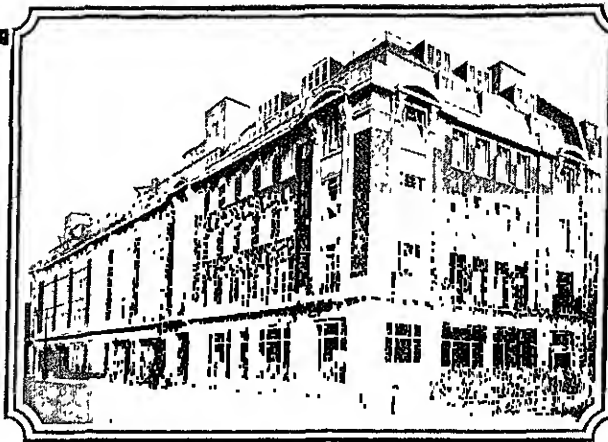
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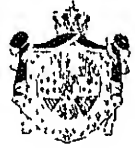
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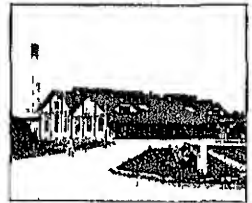
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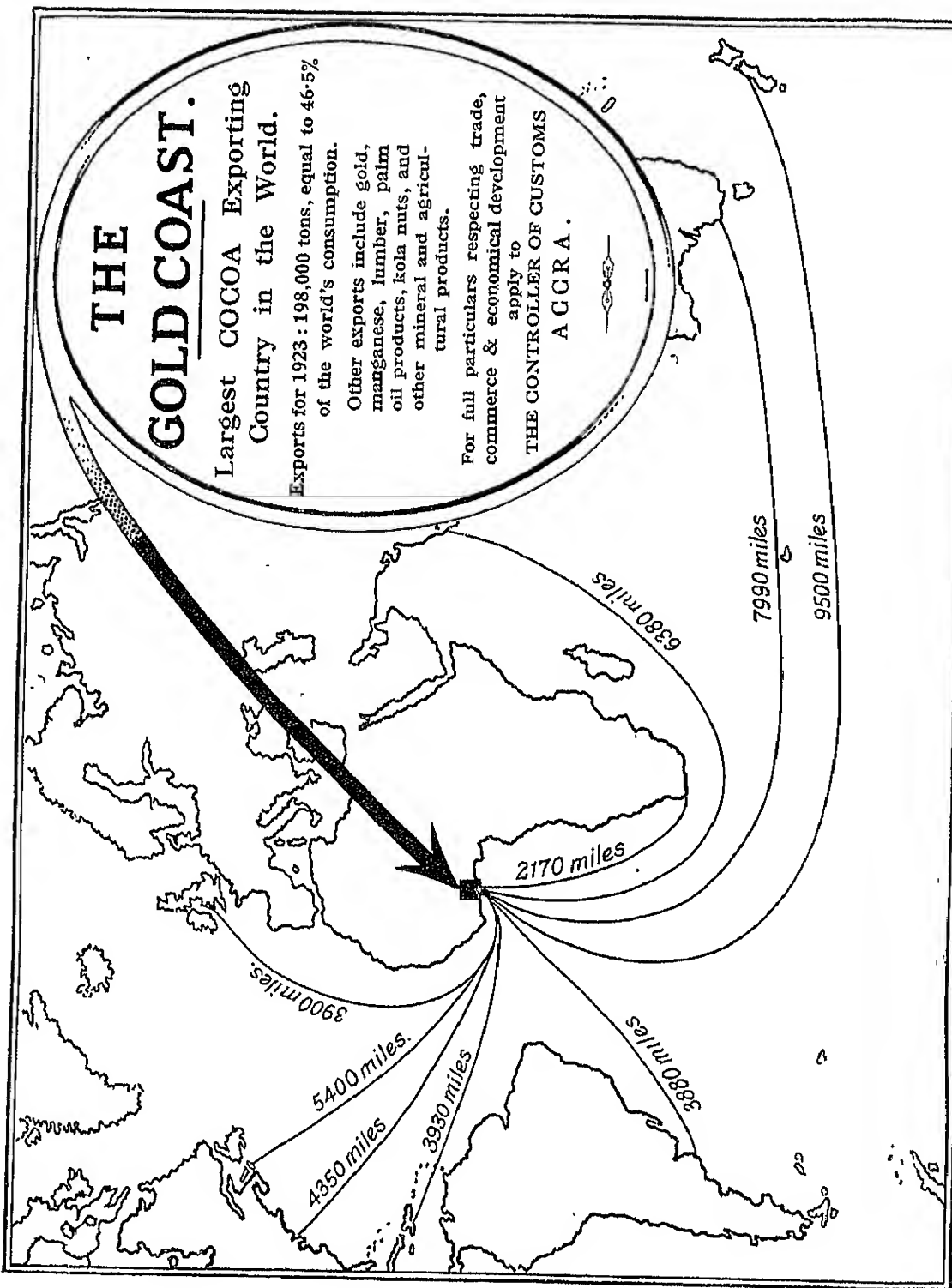
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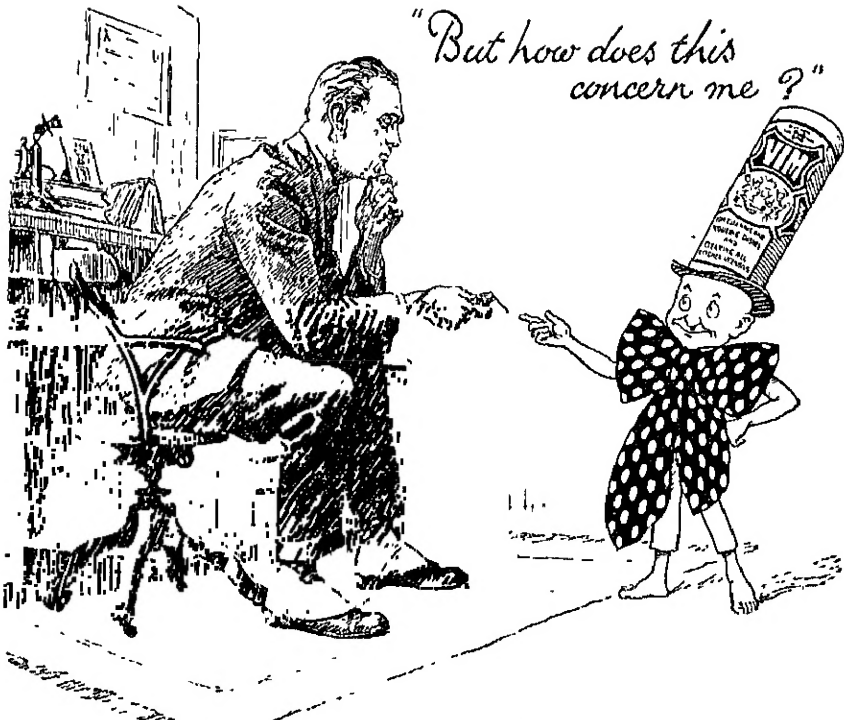
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